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Efficacy of Bromelain in controlling pain, oedema and trismus in third molar surgery: systematic review and meta-analysis

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Aim: The aim of this systematic review and meta-analysis was to determine whether bromelain is an effective drug in controlling pain, trismus and facial swelling, the major postoperative inflammatory complications after third molar surgery. Bromelain is a cysteine protease isolated from pineapple with several biological properties, including anti-inflammatory effects, due to its ability to selectively inhibit PGE2 and thromboxane, to reduce bradykinin levels, to act as an exogenous substitute for plasmin and to increase vascular permeability. Recent studies have evaluated the clinical implications of bromelain reducing postoperative inflammatory complications when used as a dietary supplement.

Materials and Methods: The study was performed following the PRISMA statement. Searches were conducted in five electronic databases (Pubmed, Scopus, Web of Science, Cochrane and Bireme), and in Google Scholar and Open Thesis, from January 2019. The following elements were used to define the eligibility criteria: (1) population: patients undergoing third molar surgery; (2) intervention and controls: bromelain vs placebo or no-treatment control group; (3) outcomes: pain, trismus and facial swelling; (4) study type: randomized clinical trials (RCTs). The meta-analysis was based on the inverse variance method for continuous outcomes; the treatment effects were defined as weighted (WMD)

or standardized mean difference (SMD) and 95% CI. **Results:** A total of 91 articles were initially retrieved from the databases. After different stages of a selection process, seven articles were included in the review. Bromelain proved to be effective in controlling postoperative pain at day 7 (MD: -0.23; 95% CI [-0.48; 0.02] p-value=0.0687); the use of bromelain also led to a decrease of facial swelling at day 7 (SMD: -0.45; 95% CI [-0.81; -0.10] p-value=0.0124).

Conclusions: These results suggest that bromelain could help reduce pain and facial swelling after third molar surgery, with slight benefits found within 48 h after surgery, a decrease of the effects on the third day and a marked improvement of the advantages in the last days of convalescence. So, bromelain could bring benefits that are statistically (and clinically) significant where the extent of the inflammatory process is moderate and not striking, therefore "within the reach" of a milder control exercised by non-pharmacological principles. However, therapeutic advances for the use of bromelain need a higher level of evidence and further RCTs are required to inform clinical choices.

Aesthetic and functional rehabilitation of atrophic maxillary arches with zygomatic implants: prospective clinical study with 11 years of follow-up

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Aim: Each rehabilitation of the oral cavity requires accurate planning and deep knowledge of the local

anatomy to offer the best rehabilitation for each patient. The aim of this study was to evaluate the clinical outcomes of patients treated with zygomatic implants up to 11 years of follow-up. These rehabilitations allow to restore function and esthetics the day of surgery in patients with extremely atrophic maxillary arches.

Materials and Methods: The surgical protocol adopted in the present study is the evolution of the surgical technique proposed by P-I. Branemark going through the subsequent changes made by JP. Stella, C. Aparicio and P. Malò. The surgical approach allows the clinician freedom in the apico-coronal positioning of the zygomatic implant. Anchorage is guaranteed by the mechanical engagement of the zygomatic bone with the fixture inserted external to the Schneiderian membrane, pushed gently inwards to maintaining its integrity. A total of 34 patients have been treated with 53 standard implants and 90 zygomatic implants. Two different configurations have been used: hybrid solution, that included a combination of conventional and zygomatic implants and a prosthesis supported solely by zygomatic implants. Only 2 standard implants failed bringing implant survival to 96.2%.

Results: All subjects received a fixed screw-retained prosthesis within 3 hours of surgery, while the final restoration was delivered after 6 months. No prostheses were lost with a full prosthesis success. The average percentage of standard implants that tested positively for bleeding on probing was 28% and the marginal bone loss ranged from 0.73 ± 0.14 mm at 6 months to 1.48 ± 0.13 mm at 11 years. 40% of the zygomatic implants showed bleeding on probing six months after loading, but only 17% evidenced clinical signs of inflammation and bleeding on probing after 11 years of loading. The main biological complication was exposure of the most coronal threads of the zygomatic implants.

Conclusions: Patients satisfaction in terms of esthetics, phonetics and masticatory functions was high throughout the entire period of the study. These results indicate that immediate full-arch rehabilitation supported by zygomatic implants could be considered a viable treatment modality for the severely atrophic maxilla.

Evaluation of mechanical properties of two different implants geometries on different polyurethane blocks densities

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Aim: To evaluate, on different densities and thickness

polyurethane sheets, two different dental implant geometries.

Materials and Methods: Two different implants (FDS76, Villa San Giovanni, Reggio Calabria), K2 (wide threads) and K3 (narrow threads) 4.2 mm in diameter and 11.5 mm in length were evaluated in the present in vitro investigation: 10 PCF polyurethane sheets with and without a cortical layer, 20 PCF polyurethane sheets with and without cortical layer, 20 PCF polyurethane sheets with a 3 mm lamina and 30 PCF polyurethane sheets with a 3 mm lamina. The present study was conducted comparing the Insertion (IT) and removal torque (RT) and the resonance frequency analysis (RFA) values of K2 (wide threads) and K3 (narrow threads) inserted in different size and different density polyurethane foam models for a total of 160 experimental sites, 80 sites per implant and 10 preparations for each condition.

Results: The IT, removal torque and RFA values were significantly higher for K3 implant in all conditions with increased results in terms of torque in and out and RFA than the K2 plant, even in the 3mm thick polyurethane blocks ($p < 0.01$). As polyurethane consistency increases, the higher values of K3 and K2 increase with ever higher values for K3 ($p < 0.01$). High torque values for K3 ($> 40N$) were achieved with the polyurethane 30PCF with cortical layer and 30PCF 3mm thickness lamina. Analysis of 3mm thick polyurethane lamina indicate that it is the last 3mm of crestal implant surface that give the implant primary stability ($p < 0.01$).

Conclusions: The K3 implant provide a cylindrical-conical geometry and a double step of threads that seems to favor the primary stability on polyurethane models especially in case of 10 to 20PCF block consistency and highest levels in case of a density of 30PCF. The K3 implant seems to be a suitable implant for an immediate load when the bone consistency is D2 or D3 with well represented cortical.

Regenerative treatment of a deep intraosseous defect involving an upper bicuspid using a minimally invasive surgical approach guided by an innovative decision tree: case report

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Aim: The evolution of minimally invasive surgery has allowed to obtain optimal results in terms of CAL gain and long-term maintenance of the compromised dental element, all accompanied by a minimum amount of gingival recession (REC) and a reduced morbidity of the surgery. All the most recent studies



agree that, in any case, tissue preservation methods improve clinical results and must be the fundamental surgical prerequisite when we approach the treatment of deep infraosseous defects. The choice of the correct surgical approach to the regenerative/reconstructive treatment of deep intraosseous defects is still a challenge for the clinician, since there is a multitude of techniques that could cause more confusion than anything else. In the last twenty years, moreover, the evolution of surgical techniques and the deepening of biological knowledge have not been accompanied by an equal evolution of biomaterials and, therefore, the last studies agree that, where possible, the use of minimally invasive techniques unrelated to biomaterials should be the gold standard in the treatment of deep intraosseous defects.

Materials and Methods: The patient, non-smoker, male (47 yo), in excellent systemic health and with periodontal disease familiarity, presented at first visit with active periodontal disease and, among others, an important intraosseous defect that started in the mesial part of 2.4 and, involving the palatal side of the same, reached its distal portion. After being subjected to careful non surgical therapy in all sextants, it was proposed, also considering the young age, a regenerative/reconstructive treatment of the bone defect surrounding the 2.4. The patient showed up on the day of surgery with a 6% FMPS and a 13% FMBS and, after carefully studying the case, following a new and experimental decision tree designed by our group, a vestibular approach was made by means of an MPPT incision between 2.3 and 2.4, followed by (due to the distal extension of the defect) an incision according to the dictates of the SPPF in the adjacent interdental space. A vestibular full thickness flap was raised according to the principles of the MIST and the interdental tissues were detached but not overturned. After degranulation of the defect, sutures were performed according to Laurell's technique.

Results: Eight months after the surgery, thanks also to an important commitment in the maintenance by the patient, who has never failed to respect the periodontal support therapy, the defect showed a total radiographic bone filling, accompanied by an optimal clinical healing of the defect and, above all, all these results have been achieved without an evident presence of gingival REC. These results are in agreement with what is reported in the scientific works of several important AA in the field of minimally invasive treatment of deep intraosseous defects.

Conclusions: Although the results obtained in terms of CAL gain and element survival were already satisfactory, the evolution of minimally invasive surgery and the increased perception of aesthetics by patients meant that among the results obtained, even the smallest amount of REC played a major role.

Socket preservation using biomaterial and epithelium-connective tissue graft of a residual alveolus after extraction of element 1.3 destroyed by caries

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Aim: The great availability of surgical techniques and biological and scientific knowledge, today, allows us to be able to be as minimally invasive as possible and, in addition, to choose the solution (surgical before and after prosthetic) most suitable for our patients. The term "socket preservation" means a guided preservation of the post-extractive cavity, with which you go, although often in a limited way, since nature still takes its course, to make less noticeable the process of bone resorption given mainly by the absence of stimulations of the periodontal ligament. We speak of a real "socket preservation" when the four walls (vestibular, mesial, distal and palatal/lingual) of the alveolus are maintained; in case one or more of them is missing, today we would speak of "alveolar ridge preservation". The ultimate goal of socket preservation is to allow the subsequent implant rehabilitation of the site remained edentulous, thus giving back to the patient aesthetics and function.

Materials and Methods: The patient, woman (56 yo), in good systemic health condition, shows up to our observation with a bridge from 1.6 to 1.3 cemented about twenty years before, which is mobile. After having carried out the appropriate endoral radiographic evaluations and having proceeded with the decementation of the prosthetic artifact, it was clear that the problem was represented by the extension of a carious process at the expense of 1.3, which was now totally destroyed, leaving only a root fragment. The treatment plan included the atraumatic avulsion of element 1.3, the preservation of the alveolus and its subsequent implant rehabilitation. First, the extraction was carried out, for which it was preferred to use also the dedicated ultrasonic handpiece, so as to make it as atraumatic as possible. The next step was the assessment of the clinical situation of the alveolus and then, with a millimeter probe UNC-15, was established the presence of the four bone walls constituting the alveolus that were shown almost completely intact. Given the size of the alveolus, a block of collagen has been inserted in the deepest portion and the deproteinized bovine bone in granules in the most superficial one, leaving however some millimeters of distance from the gingival margin. Having a good amount of keratinized tissue and being the area immediately distal to the post-extractive site edentulous, we proceeded to the removal of a small

amount of epithelium-connective tissue graft, which has subsequently been located to the surface of the site and covered by an X-suture without itself having been affected by the passage of the needle (which would cause early necrosis). The sampling area was buffered with a fibrin sponge and then sutured. The bridge was readapted and provisionally cemented. The patient was examined ten days after surgery to proceed with the removal of the sutures.

Results: Four months after the surgical treatment, the site object of socket preservation was shown to be almost totally maintained, with a more than satisfactory clinical and radiographic healing. At this point, implant rehabilitation of the remaining edentulous area will be planned.

Conclusions: Socket preservation is not an extreme act of rescue of a compromised area, but an aid to the clinician in dealing with the process of bone remodelling that will happen, thus making more favourable the future possibility of implant rehabilitation.

Efficacy of L-PRF plugs in reducing bleeding complications after tooth extraction in patients under DOAC or VKA therapy: a prospective cohort study

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Aim: To assess the efficacy of L-PRF as hemostatic agent, comparing the post-operative bleeding after simple tooth extraction in patients under treatment with Vitamin K Antagonists (VKAs) or Direct Oral Anticoagulants (DOACs).

Materials and Methods: Patients under oral anticoagulant therapy (VKA or DOAC) who needed single tooth extraction were enrolled in this study. Each patient underwent simple single tooth extraction with a standardized minimally traumatic technique. Anticoagulation regimen was not modified before and after extraction. All the participants were evaluated pre-operatively, during surgery, thirty minutes after surgery and seven days after surgery (suture removal). Personal data, medical history, pharmacological therapy, local periodontal and dental variables were collected at baseline. Peripheral venous blood withdrawal was performed immediately before surgery by using 9 mL plastic tubes, with no additional chemicals. Subsequently, the blood sample was centrifuged (Intralock®, Boca Raton, USA) at 2700 rpm for 18 min. All dental extractions were performed by the same surgeon (FB) with no elevation

of mucoperiosteal flap and/or ostectomy, in the least invasive possible approach and with a maximum surgical time of 15 minutes. After performing the extraction, a careful alveolar curettage was performed and L-PRF plug was positioned in the alveolus as a hemostatic agent. The wound was sutured with a 3-0 braided silk. Patients were then instructed on post-operative care to be observed during the 7 days following the intervention. Biological complications were registered and post-extraction bleeding was described according to Iwabuchi classification.

Results: 111 patients were enrolled (52 and 59 in VKA and DOAC group, respectively) and underwent the extraction of 111 teeth. 46 patients were female and 65 were male (77,6 ± 10,13 years; age range 32-96). No differences were demonstrated between the two groups in terms of age (T-test for unpaired data; $p=0,405$) and gender (Fisher exact test; $p=1$). The results of the present study did not show any statistical difference between VKAs and DOACs regarding the post-extraction bleeding complications (Fisher exact test; $p=0,801$).

The distribution of bleeding events according to Iwabuchi classification resulted homogeneous between the two groups (Chi-quadro; $p=NS$). In detail: no intra-operative bleeding occurred; 7 patients in VKA group and 8 patients in DOAC group reported a post-operative bleeding managed with a single gauze compression during the week after the extraction; 2 patients of VKA group needed more than two gauze compressions and 1 DOAC patient needed medical intervention the day of suture removal, due to the rupture of hyperplastic clot.

Conclusions: L-PRF may be use as an autogenous, safe and cheap hemostatic agent for the management of bleeding events after dental extractions. Clinicians should be aware of the hemostatic property of L-PRF that may be used routinely in case of patients under anticoagulation therapy to avoid bleeding complications. Patient education for the post-operative care of surgical site appears also strictly necessary.

Treatment of an extensive periapical lesion on upper bicuspid prosthetic abutment with endodontic surgery: case report

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Aim: The treatment of endodontic surgery, identified in an approximate way also with the term "apicectomy", involves the removal of the endodontic lesion present at the periapical level, removal of a terminal portion

of the dental root and retrograde filling of the endodontic space. Although it represents a treatment usually secondary and subsequent to the orthograde root canal treatment of the dental element, there are cases, such as the one reported here, in which endodontic orthograde treatment cannot be the first choice due to limitations dictated by clinical circumstances.

Materials and Methods: The patient, a woman, shows up to our observation with the presence of a fistula located on the vestibular gingival slope in region 1.5. It reports a recurrent-intermittent trend of the appearance of the fistula itself and, consequently, an endoral radiographic evaluation is carried out. The radiographic examination is clear, because of the presence of a wide but circumscribed periapical radiotransparent lesion, as the problem is closely related to an endodontic problem of the element 1.5, which, however, has already been treated endodontically and features a fused pin and a metal-ceramic crown. In order to overcome the operational problem caused by the clinical need and to avoid the costs for the patient of a new prosthetic remake, since it would have been necessary to remove the prosthetic crown and the metal pin and the orthograde reprocessing, we opted for surgical treatment of the lesion resulting in apicectomy and retrograde obturation. On the day of the surgery, after having performed the appropriate local anesthesia, a trapezoidal flap with festooned paramarginal incisions was drawn, extended from 1.3 to 1.6. After having detached it to total thickness, the flap was lifted and the small fenestration present drove the subsequent osteotomy carried out with rotating instruments. The next step was to remove the lesion, which was then sent in pathological anatomy for appropriate analysis. At this point, after the debridement of the surgical site, ferric sulfate gel was used to promote hemostasis and ensure optimal vision to the operator. After cutting 3-4 mm of radicular apex with rotating instruments, the accurate retrograde preparation of the radicular channel terminal part was carried out by means of appropriate ultrasonic inserts. Then retrograde filling was carried out by surgical cement based on ethoxybenzoic acid, removed all ferric sulfate, repositioned the flap and sutured. Upon completion of the surgery, after performing an endoral X-ray showing the correct filling of the terminal section of the root canal, an antibiotic cover was prescribed to the patient for 5 days and the use of painkillers was recommended only in case of need.

Results: After 10 days, when the sutures were removed, the fistula had already disappeared and the patient reported a certain sense of well-being. After 9 months an endoral X-ray of control was carried out in which it was easy to notice the presence of a remineralization of the periapical area, a sign of excellent quality of

the apical seal.

Conclusions: Although there are often protocols that guide our daily clinical practice, there are cases in which the clinician must be able to offer the patient the most suitable solution, always pushed by the Hippocratic "primum non nocere" that should be the milestone of our mindset.

Implant survival after surgical reconstructive treatment of peri-implantitis infrabony defects of various configurations: 5-year results from a prospective study

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Aim: To evaluate the long-term (5-year) clinical outcomes of a reconstructive surgical protocol for single peri-implantitis defects with different bone morphologies, by means of deproteinized bovine bone mineral with 10% collagen (DBBMC) in patients enrolled in an individualized supportive periodontal/peri-implant (SPT) program.

Materials and Methods: The original population consisted of 75 patients with one crater-like defect with a probing depth (PD) ≥ 6 mm and no implant mobility. After flap elevation and tissue degranulation by means of titanium curettes and a titanium brush, implant surfaces were decontaminated with EDTA 24% for 2 minutes and chlorhexidine gel 1% for 2 minutes. Consequently, the defects were filled with DBBMC and the flap was sutured around the collar of the implant for optimal non-submerged healing. Sutures were removed after 2 weeks. After initial healing, patients were enrolled in an individualized SPT program.

Results: Fifty-one patients reached the 5-year examination, as 11 patients were lost to follow-up and 13 implants had to be removed. The overall treatment success, defined with a composite outcome (i.e. no PD > 5mm, no BOP, no PUS, no further radiographic bone loss) was assessed in 29 patients (39%). Mean PD significantly decreased from 6.89 ± 1.58 mm to

3.82 ± 1.07 mm ($p < 0.001$) at one year and remained stable for the rest of observation period (4.06 ± 1.12 mm). Mean BOP changed from 70.6 ± 34.9 % to 9.3 ± 18.7 % at 1 year and to 17.2 ± 22.1 % at the 5-year examination. No correlation was found between either survival or success rate and the configuration of the defects. Patients, who did not completely adhere to the SPT, experienced statistically more implant loss than those who regularly attended recall appointments ($p = 0.009$).

Conclusions: Therapy of peri-implantitis, by means of the proposed reconstructive approach, followed by regular supportive care resulted in high survival rate, at the 5-year follow-up. Defect configuration does not seem to have a significant impact on the clinical outcomes. Nevertheless, patients who did not optimally adhere to a SPT regime experienced more implant loss than those who attended regular recall appointments. Therefore, the decision whether to treat or remove an implant affected by peri-implantitis should be taken after a careful evaluation of several factors, starting from the motivation and the compliance of the patient.

Is antibiotic prophylaxis mandatory in oral surgery?

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Aim: To provide the most updated information on the use of antibiotic therapy in patients undergoing oral surgery procedures such as third-molar extraction or implant placement.

Results: Nowadays data are not yet conclusive on the real benefit of antibiotic prophylaxis, especially in healthy patients. In case of implant placement surgery, several case-control studies show how patients with prophylaxis have a better outcome and a lower rate of infection under antibiotic treatment, but these outcomes are not statistically significant. On the other hand, other data show that antibiotic treatment prior surgery is effective in reducing the risk of implant loss in cases of complex implant surgery. A single high dose before treatment is currently considered to be equally effective and to minimize side effects while postoperative antibiotic prophylaxis is not justified. In case of other surgical performances such as extraction, few studies show that antibiotic prophylaxis is effective in reducing the surgical site infection, especially in lower third molars extraction. Data indicate a difference in the incidence of infection in the surgical site in patients under antibiotic prophylaxis, which

remains between 2.4 and 3.5% compared to 8.9-15% in patients without antibiotic treatment prior to the intervention. Other studies do not consider antibiotic prophylaxis necessary, since benefits are not statistically relevant especially in young patients in good health. It is suggested to consider more carefully the risk factors during surgery, such as the need to perform an osteotomy, presence of extensive cavities or periodontal illness: being these same infectious foci, surgery can cause the dissemination of pathogenic organisms in the tissues and cause an infection at the surgical site.

Conclusions: A single dose of antibiotic prior a surgical procedure in dental surgery seems to be adequate. Anyway, the lack of strong evidence of antibiotic prophylaxis benefits in oral surgery impose a customized approach to the patient therapy, focusing on risk factors. In conclusion, considering antibiotic resistance threats, further investigation on this item is needed.

Analysis of the CTX in oral surgery: relation to the period of intake of bisphosphonates. A systematic review

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Aim: To determinate the value of C-terminal cross-linking telopeptide test (CTX) in patient who takes Bisphosphonate to prevent osteonecrosis of jaw (ONJ).

Methods: A comprehensive search of studies published up to March 2020 and listed in the PubMed/MEDLINE and Cochrane Library databases, was performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The key words used in this study were: "ctx & osteonecrosis". The search identified 99 publications; 6 studies were finally deemed eligible for inclusion according to the study criteria. These studies included a total 104 patients and was selected 101, The average value of the 101 subjects included was 126 pg/ml, while the average period of drug intake was 50.3 months. The most used drug is alendronate (88 patients), follow by risendronate (8), there are also eight patients taking intravenous bisphosphonates zoledronic acid (7) and pamidronate (1). Patients were analyzed several times, based on specific parameters. In a first investigation the patients (84) were divided into groups by age and by the period of taking the drug, the age groups are ≤ 59 years, 60-69 years, 70-79 years and 80-89 years, the period of taking the drug is < 36 months and ≥ 36 months. The investigation shows that

only two groups have a CTX>150 pg/ml (parameter considered by Marx in 2009 for low-risk surgery), and for both groups the common discriminant is an intake of less than 3 years. For the other groups the value is less than 150 pg/ml. The value of 150 pg/ml is not considered a correct parameter for this evaluation as a discriminant according. A second investigation (101 patients) instead related the period of taking the drug, regardless of the age of the subject or sex, the results are divided into <20 months, 20-39 months, 40-59 months, 60-79 months, 80-99 months, >100 months. Only the first group showed a CTX>150 pg/ml, all the others have a lower value.

Results: The results obtained in this study show us that only one group has a CTX value with minimal risk, all the others are instead at medium risk (Marx in 2009 attributes a medium-risk surgery CTX values between 100 pg/ml and 150 pg/ml); moreover, we are confirmed that at low risk there are those who have been taking the drug for relatively little time. CTX is one of the few parameters that has not been absolutely excluded to assess the risk of osteonecrosis associated with bisphosphonate drugs, in the evolution of the studies certain bone markers have been introduced and subsequently eliminated.

Conclusions: The results obtained show us that the value of 150 pg/ml is disproportionate, since it is difficult to find patients with higher values and above all it is impossible to think that for lower values we would always encounter osteonecrosis, therefore the values found in this study if they were to be confirmed by other studies could revive a new standard.

Comparative analysis of the peri-implantary tissue's response of standard vs short implants

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Aim: In medicine, smoking is considered a risk factor for numerous pathologies, in the field of odontostomatology the importance that smoking affects the risk factors of cancerous and precancerous lesions, but above all the strong impact it has on dental support tissues cannot be overlooked. and on peri-implant tissues. Our study has the task of evaluating and comparing if this manifestation also occurs on short implants, by comparing standard implants and short implants in the same site and in the same patient. It also tries to compare the evaluation using the same method also for non-smokers and former smokers. The goal of this clinical study is to evaluate through the clinical and (radiographic) survey the different

biological responses of hard and soft tissues adjacent to standard and short length implants in smokers, non-smokers and former smokers.

Methods: This study was a comparative analysis on three groups of patients. Patients were eligible if they needed an implant in the posterior maxillary and mandibular area, both with a sufficient amount of bone, using standard size implants and with reduced heights, using reduced size implants so as to avoid any regenerative bone therapies. aimed at increasing the vertical dimensions. Clinical and radiographic evaluation was performed after 4/6 months (T1) and after one year (T2). 100 patients were included, for a total of 200 implants: 100 standard size implants and 100 short implants, 39 women and 61 men aged 19 to 83 years (mean 51.89 years) and have received care since October 2017 as of November 2019. Among them, there were 34 smokers, 29 former smokers and 37 non-smokers. 100 short implants were placed, 62 in the maxilla and 38 in the mandible and 100 conventional length implants.

Results: The main results were the recordings of clinical aspects such as presence of inflammation, evaluation of color and gingival appearance and radiographic evaluations differentiating the maxillary and mandibular implants.

Conclusions: The statistical results obtained showed us that there is no substantial difference, in terms of biological responses of peri-implant tissues, between standard or small-sized implants, but they confirmed the influence and alteration of biological healing processes. that smoke is able to create.

Comparative clinical evaluation of four types of sutures used in oral surgery

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Aim: The suture is a decisive phase of oral surgery, problems in this phase can compromise the success of a surgery. The ideal suture material must have optimal physical-mechanical and biological characteristics, with good tensile strength, atraumatic tissue, durability of the knot associated with inertia of the material, biocompatibility, resistance to bacterial adhesion. The suture thread most used in dentistry is silk but this is a non-inert material and promotes bacterial proliferation and can cause disadvantages. Synthetic monofilament yarns, on the other hand, do not traumatize the tissue thanks to their good smoothness, knots can be difficult to perform. Aim of this study was to compare the sutures used: monocryl,

ethibond excell, vicryl * plus and Silk.

Methods: The comparison study was carried out on 2,000 patients relating to the dental clinic's University of L'Aquila. The inclusion criteria: aged between 18-65 years; absence of systemic pathologies; not taking antibiotics and/or anti-inflammatories in the two months prior to the surgery; the need for interventions that require the use of sutures; the absence of inflammation and/or suppuration in the surgery area. All patients received professional hygiene seven days before surgery. The patients were divided into four groups of 500 each, the sutures used were: monocryl, absorbable monofilament; ethibond excell, non-absorbable; synthetic woven suture, vicryl * plus; absorbable braided thread with antibacterial surface, Silk intertwined. All suture types were equipped with a triangular 16 mm 3/8 needle, 4-0 in diameter. The follow-up were carried out at 3, 7 and 14 days. All sutures were removed at day 7, even absorbable ones. For each of the threads under examination, a judgment was expressed, with a score from 0 to 10, regarding smoothness, manageability and resistance, detected during the application of the suture.

Results: Monocryl with an average score of 8.47 was the most fluent; Silk the worst (5.60); ethibond excell (7.47); vicryl (7.46). Silk (7.82) has the best manageability, followed by vicryl (7.46), monocryl (6.68) and ethibond excell (6.47). The most resistant are monocryl (8.92), vicryl (7.77), ethibond (7.43) and silk (5.21). The parameters noted during the operation and for each of the subsequent checks were: degree of wound edema 2-abundant, 1-present, 0-absent; degree of gingival inflammation: 2-abundant, 1-present, 0-absent; quantity of periwound plaque: 2-abundant, 1-present, 0-absent; presence/ absence of wound suppuration: 2-abundant, 1-present, 0-absent. The 3-day check shows that ethibond is the ideal yarn in all the aspects studied, silk instead gives us higher edema and inflammation values than the other two yarns that have intermediate scores. At 7 days ethibond is still the best but vicryl has overlapping values. Silk and monocryl show an improvement in general conditions compared to the third day control. On day 14, monocryl turns out to be the best wire, practically values close to 0 in all the parameters studied, especially as regards the periwound plaque, which instead settles at 0.33 for the other wires under study. Ethibond is the best of all threads in terms of edema and inflammation, vicryl has higher values in all fields of study compared to the 7-day control.

Conclusions: Synthetic threads are certainly to be preferred to silk, at the expense of less manageability they guarantee us greater resistance and smoothness. The parameters of the surgical evaluation, although at 14 days they are similar among all the threads,

always show favorable values for synthetic threads compared to silk, even at 3 and 7 days.

Clinical efficacy and structural morphology of CGF in guided bone regeneration

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Aim: An histological and clinical evaluation of CGF membrane. Architecture and variations of the fibrin polymer and any corpuscular elements were analyzed. The study is based on the histological analysis of CGF membrane and clinical evaluation of implant sites.

Methods: One single patient, female, 46 years old, no smoke habits, was enrolled. The implant treatment had become necessary in order to rehabilitate prosthetically the third quadrant, especially elements 3.4, 3.5. For the correct management of soft tissues, it is proceeded with the application, at the implant sites, of two CGF membranes, obtained by patient's venous blood, collected without anticoagulant solutions in sterile Vacuette tubes. The tubes are kept for centrifugation with one step centrifugation protocol. Other two CGF membrane were histological analyzed. Microscopic evaluation of histological samples showed three concentric layers of CGF membranes. The first layer consists of plasma proteins and anucleated corpuscular elements (therefore belonging to the erythrocyte line) The second layer consist of many cellular elements trapped in the dense fibrin network and the third layer, showed corpuscular elements, probably belonging to the megakaryocytic cell line.

Results: CGF can be considered as the latest generation of fibrin matrix blocks with a high concentration of growth factors useful for tissue repair and regeneration. Morphological characteristics have not been described as widely as the membranes of PRP and PRF. As PRF, CGF looks like a matrix of fibrin and blood cells, but the particular polymerization makes it denser and more manageable by the clinician. In particular the clusters of cells of the megakaryocytic line in the more peripheral layers and the particular arrangement of the polymer fibers, it is advisable to use, for regenerative purposes, were platelets and megakaryocytes growth factors are associated.

Conclusions: The study further demonstrates the regenerative capabilities of CGF membranes, in line with the various case reports in the literature and integrates information on the morphological characteristics of the membrane, which support the indications and clinical use of this therapeutic device.

Histologic and histomorphometric analysis of maxillary sinus augmentation

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Aim: To evaluate the bone regenerative potential of three different bone substitute materials (Bio-Oss, Laddec, Surgipluster), used as graft in maxillary sinus augmentation, by assessing histological and histomorphometric analysis of bone biopsies retrieved from sinuses augmented after a 6-month healing period.

Materials and Methods: Sixteen patients (11 females, 5 males, aged 40-70), healthy, no smokers, with no periodontal disease, presenting edentulous posterior maxilla with a residual vertical height bone crest ≤ 5 mm, were selected to receive sinus augmentation procedures and delayed (6 months) implant placement. Patients were split in two groups: In group I, six patients received unilateral sinus augmentation, using Bio-Oss; In group II, ten patients received bilateral sinus lift, five with Bio-Oss and Laddec, five using as graft Bio-Oss and Surgipluster. After six months, at time of implant placement, bone biopsies were carried out, and were processed for histological and histomorphometric analysis. Histomorphometric analysis evaluated: amount of osteoclast/ bone surface; osteoblastic surface/ bone surface; bone volume/ total volume.

Results: No signs of acute inflammation were observed. At histological examination, Bio-Oss and Laddec showed largest amount of newly formed bone. The grafted granules were surrounded by a bridge-like network of newly formed bone. Newly formed bone was in direct contact with Bio-Oss particles. Bone tissue appeared mature and compact. Trabecular bone with large narrow spaces was observed around Surgipluster particles. At interface bone-Laddec was observed presence of capillaries, fibroblasts and macrophages. The histomorphometry revealed $38\% \pm 1,6\%$ newly formed bone, $33\% \pm 1,6\%$ intertrabecular spaces, $30\% \pm 1,4\%$ residual grafting material for Bio-Oss; $37\% \pm 3,2\%$ newly formed bone, $44\% \pm 1,3\%$ intertrabecular spaces, $12\% \pm 2,1\%$ residual grafting material for Surgipluster; $36\% \pm 2,3\%$ newly formed bone, $22\% \pm 1,6\%$ intertrabecular spaces, $36\% \pm 3,2\%$ residual particles for Laddec.

Conclusions: Within the limitation of the present investigation, all biomaterials showed biocompatibility and osteoconductive properties in sinus augmentation procedures. Bio-Oss seemed to have a better histomorphometric result in terms of newly formed bone, intertrabecular spaces and residual graft material.

Evaluation of peri-implant soft tissues reaction in relation to the prosthetic components

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Aim: The reaction of peri-implant tissues is strongly influenced by the shape, location, diameter and kind of the prosthetic abutment. This study aims to evaluate the Papillary Bleeding Index (PBI), Probing Pocket Depth (PPD) detected in three vestibular areas (mesio-vestibular, vestibular and disto-vestibular) and three palatal areas (mesio-palatal, palatal, disto-palatal), and the presence of inflammation by positioning 100 implants on 78 patients.

Materials and Methods: 54 out of the total 100 implants were positioned in the frontal section, while 46 in the rear area, furthermore, 11 were cylindrical, while 89 have a conical shape. 14 had a diameter of 3,30mm, 40 with a diameter of 3,80mm and 46 had a diameter of 4,25mm. Lastly, 47 presented a straight abutment, 34 presented a 15° inclined abutment, and 19 presented an inclination with an angle of 25°.

Results: The analysis of the gathered data revealed that the rear sector presented higher signs of bleeding and suppuration, as well as an increased Probing Pocket depth (PPD); while on the contrary the frontal sector presented increased signs of inflammation. Analysing the shape, the implants of a cylindrical shape presented higher signs of bleeding and suppuration, and increased signs of Probing Pocket depth (PPD) in comparison with the 89 implants of a conical shape, which in turn, showed higher inflammatory signs. The diameters of the implants taken into analysis in this study presented differentiated results the implants with diameter of 3,30 mm showed increased signs of Probing Pocket depth (PPD) ≥ 3 mm in higher percentage compared to the implants of different size taken into account in this study; the implant of diameter of 3,80 mm revealed increased signs of bleeding and suppuration; lastly the implants of bigger size, 4,25 mm, showed a higher percentage of inflammation in comparison with the other two of smaller sizes. The data gathered analysing the type of prosthetic abutment revealed differences due to the different angle of the abutment: the straight abutment showed higher signs of periodontal suffering as well as increased evidence of inflammation compared to the 15° and 25° angled abutments; while the 25° inclined abutment presented symptoms of bleeding and suppuration.

Conclusions: It is crucial to underline that in spite of the limitations posed by a narrow statistical sample, it is still valid to conclude that the different characteristics on the level of location, diameter, shape and type of

prosthetic abutment strongly influence the reaction and handling of soft tissues. In particular, we can affirm that peri-implant tissue impairment is correlated predominantly to implants presenting a cylindrical shape with a diameter of 3,30 mm. These conclusions are not to be associated only with a strictly statistical analysis, but in particular to the evaluation of Student's T parameter which demonstrates whether the comparison of the means of determined values and data from a population sample is varied enough to be attributed to chance and randomness. In other words, the closer Student's T value is to zero, the lower will be the probability that the difference between the values obtained is traceable to randomness and chance. In view of the foregoing study, the implants analysed determining a Student's T value tending to zero are the ones presenting a cylindrical shape with a diameter of 3,30 mm, particularly when observing the increase in Probing Pocket Depth (PPD).

Bone condenser (osteotome)

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Aim: If a patient has been missing his or her natural teeth for some time, a substantial amount of bone resorption is likely. This lack of bone makes placing endosseous dental implants a challenge. Typically, bone-grafting techniques have been used to address this problem; however, bone-grafting techniques require two surgical procedures, are time consuming and costly for the patient. Although bone-grafts are still available and widely used, a bone condenser can eliminate the need for a bone-grafting procedure before implant placement. Instead of using a bone-grafting technique to address narrow ridges, a bone condenser can be used to osteotome for condense and expand the alveolar bone. Moreover the bone condenser is successfully used on most of the routine oral surgery procedures and for the most advanced protocols where saving the residual bone is crucial such as extractions, sinus lift, ridge split, bone modelling, bone condensing. The bone condenser have more advantages for the operator and patient, for example no irrigation is required for use, no production of aerosol.

Conclusions: The bone condenser is very speedy, the impulse delivers much more force than manual tools. This means increased effectiveness during a procedure. The ergonomics of the hand piece allows the doctor to use only one hand to position the instrument exactly where needed, using a precise longitudinal movement that avoids deviations to varying bone densities. And most important It moves, replaces, re-shapes, condenses the bone. It never removes the

bone. With bone condenser it is possible immediate implant and provisional crown placement because the bone condenser varying bone densities, moreover the osteotome condenses the bone during the preparation of the implant site and it will then be the implant that, during the screwing phase, will finish the expansion up to the established length.

Endodontic surgery in a central upper incisor with a large periapical lesion obtured with thermoplastic gutta-percha: a case report

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Aim: Over time, various filling materials such as silver amalgam and IRM have been used for endodontic surgery, with results not always predictable. Nowadays the most used materials are the mineral trioxide aggregate (bioactive) and, as gold standard, ethoxibenzoic acid (resinous). The aim of this case report is to show the healing of an important periapical lesion treated by endodontic surgery using the most knowed material for orthograde therapy and never used in the retrograde one: gutta-percha.

Materials and Methods: The 69-year-old patient, apparently in good health and non-smoker, come in our clinic due to the presence of a continuous fistular drainage in zone 1.1. Performed an endoral preoperative rx, it is evident the presence of a metal-ceramic crown supported by a metal cast without a complete endodontic obturation. The preferred treatment would be to attempt an orthograde approach, but the probability of having to renew the prosthetic restoration led the patient to ask for an approach that did not involve the crown. Following anesthesia with articaine with adrenaline, a trapezoidal flap with paramarginal incision is performed, in order to avoid consequential recession and discover the metal part of the crown. After finishing the ostectomy, partially made by the progression of the lesion in time, we proceed to control the bleeding with ferric sulfate, then going to remove 2-3 mm of apex with a cut at 90°. Retrograde canal preparation is carried out with dedicated ultrasonic inserts for 3 mm in length. The canal, however, had a patency of more than 3 mm, then, after several washes of the canal and dry, proceed to the filling by injection of thermoplastic gutta-percha and subsequent compaction, it was able to fill the entire lumen. The surplus of gutta-percha was removed, then it was reassembled. After the surgery, the flap was sutured. After 10 days the patient returned to the clinic to remove the sutures.

Results: When the patient come back to the clinic for



sutures removing, the fistula it's no longer present. The 8-month follow up rx shows a complete healing of the periapical lesion. No recession was present because a paramarginal incision was performed.

Conclusions: Although gutta-percha is not the preferred material for obtaining a three-dimensional seal in endodontic surgery, in this case report we show that the seal has been obtained. The variables for success in this discipline are many, and the three-dimensional seal is one of those. Given the results, it would be appropriate to carry out further studies on this technique to confirm the results obtained in this case report and, possibly, to have an additional therapeutic possibility.

Vertical ridge augmentation (VRA) using reinforced PTFE meshes versus customized titanium meshes: preliminary results of a randomized clinical trial

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Aim: To analyze the results obtained with GBR using titanium-reinforced PTFE meshes compared to GBR using customized titanium meshes. In particular, healing complications and benefits for the patient and the operator were evaluated.

Materials and Methods: The preliminary data included 10 patients, 6 (control group) were treated with titanium-reinforced PTFE mesh (RPM); 4 (test group) were treated by means of customized titanium mesh (Yxoss CBR). During reconstructive surgery (t0), a full-thickness flap was elevated and passivated, then cortical perforations and autogenous bone harvesting was performed. At this point, the randomization took place, determining the surgical technique to be used. The modelled device, filled with the grafting material, was stabilized by osteosynthesis screws and covered with resorbable collagen membrane. Primary closure of surgical sites was obtained. The PROMs (Patient-reported outcome measures) were self-reported by each patient on a daily questionnaire, while anxiety and stress levels of the operator were evaluated both with subjective and objective measures, using visual analogue scale (VAS) and electrocardiography (ECG). Finally preparation time, operative time and costs were compared.

Results: The healing complication rate was 17% in the control group and 25% in the test group. The mean time for surgery preparation was 18 min in the control group and 103 min in the test group, while the

mean duration of surgery was 110 min and 107 min, respectively. The mean total cost of surgery was 830€ in the control group and 1.112 € in the test group. No difference was found between study groups in anxiety and stress levels of the operator. Both the level of postoperative pain and the mean dosage of anti-inflammatory drugs decreased from day +1 to day +14, in both study groups. Finally a high incidence of swelling was reported, followed by "difficulty in opening the mouth" in the control group and "neuro-sensory alterations" in the test group.

Conclusions: The preliminary results of this RCT showed that GBR using both devices is a reliable and predictable solution for bone augmentation of atrophic ridges. In fact, healing complication rates are in accordance with the mean values reported in the literature. Preparation time and surgery costs revealed a significant difference between study groups, while operative time was similar. Moreover a different patient distribution according to postoperative symptoms between study groups was reported. In conclusion, within the limits of this preliminary study, both techniques could be used successfully for bone augmentation. Further studies are required regarding patient and operator benefits and drawbacks.

Clinical management of horizontal bone defects: various treatments

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Aim: Implant-supported oral rehabilitation in areas where maxillary bone resorption has occurred can be very complex. When an extraction takes place there is a remodeling of the alveolar process, first in width and later in height. This occurs mostly in the first six months after the exodontia, with a more horizontal than vertical bone resorption. Therefore, a subsequent implant-supported rehabilitation, when necessary, might be compromised if bone resorption prevents implant placement in the conventional manner. There are different surgical alternatives that allow us to treat these cases in which there is insufficient bone width among which we highlight only grafts, guided bone regeneration, osteogenic distraction, narrow implants, the SBBT technique (Split Block Bone Technique), the use of dilators or expanders as well as the Split Crest technique. During the osseointegration period the main changes in bone remodeling will occur within the framework of the displaced fragment, that's why some authors recommend to combine the Split Crest technique with a guided bone regeneration especially in those cases of aesthetic demand in which the vestibular volume is more important.

Materials and Methods: We performed a review of the techniques used for the resolution of horizontal bone defects in order to compare them.

Results: We showed a clinical case with a horizontal maxillary bone defect which might prevent the placement of implants in a conventional manner, and that might require additional surgical techniques for their placement.

Conclusions: There are numerous surgical techniques for the treatment of horizontal bone defects in the upper jaw when we need an implant-supported rehabilitation. The Split Crest technique avoids the need for a donor site for a horizontal bone gain, thus improving postoperative morbidity for patients. In addition, this technique allows us to place the implant in the same surgical act. The main disadvantage of this technique is the probability of a resorption of the displaced vestibular bone fragment. For this reason, in order to reduce or avoid this risk, it is essential that the displaced bone fragment does not present mobility since it might become necrotic and subsequently reabsorb. The survival rate of implants associated with Split Crest is 91.7-100% although a longer follow-up time is needed for these implants since in the current literature there are few studies published on implants treated with Split Crest technique with a follow-up longer than three years.

The surgical combined split crest and GBR technique on atrophic maxillary alveolar ridge with horizontal bone defects: a clinical case report

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Aim: Among the available techniques the authors have gained more experience with the "Edentulous Ridge Expansion" (E.R.E.), presented in 1994 by Dr. Bruschi and Dr. Scipioni. The technique is based on the reparative potential of cancellous bone, associated with a surgical approach aimed to the preservation of the periosteum. The intraosseous fissure is initially filled with a blood clot, which with the passage of days (about 40), transforms into osteoid tissue. The latter, in turn, tends progressively (by about 90-120 days) to mature due to an increased mineralization of the extracellular matrix and the transformation of osteoblasts into osteocytes. During the process of bone regeneration with split ridge it is essential to ensure an optimal trophic base to the bone itself, trying to guarantee a minimum thickness of 1-1.5 mm to the bone flap. In addition, an abundant periosteal blood supply is required. This allows to limit fenestrations, dehiscences and necrosis of the bone flap during the implantation and healing phases.

Materials and Methods: We performed a review of the methods used to solve horizontal bone defects with the Split Crest and GBR technique on atrophic ridges by carrying out a private case report. The intent therefore remains to propose a valid protocol that is not a substitution but an alternative to the pre-existing ones, which have already been exhaustively described in the literature. The present protocol has also been recognized and published by the authoritative British Journal of Oral and Maxillofacial Surgery.

Results: Thanks to the satisfactory results obtained, we can state that this method is almost always predictable. For the execution of this technique, an in-depth knowledge of the anatomy and pathophysiology of the maxillae is extremely important. It's also important the early diagnosis that allows the clinician to plan a therapeutic treatment that offers the best guarantee of success.

Conclusions: The E.R.E. is indicated in knife-edge ridges with a height of at least 10 mm and a minimum thickness of 4 mm. The disadvantage of this technique is the risk of fracture of the vestibular bone flap during the procedure of its displacement. Therefore, the predictability of this technique is not absolute. To limit this risk the flap is unglued in partial thickness, in order to ensure irrigation of the bone cortex in case of a fracture. If, on the one hand, a partial thickness flap reduces the above-mentioned risk, on the other hand, not ungluing the periosteum does not allow to use GBR technique that might be necessary in the intra-operative phases, especially when a guided implant surgery is aimed at. Because of this need in recent years the authors have developed a modified split-crest technique associated with contextual guided bone regeneration, in order to compensate any dehiscence and/or fenestration, to minimize the loss of marginal bone and to fill the gaps between bone and implant.

Stomatological management of the patient under bisphosphonate therapy

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Aim: Bisphosphonates are synthetic pyrophosphate analogs that regulate bone metabolism of calcium and phosphorus (Ca, P), binding to hydroxyapatite and inhibiting its reabsorption by osteoclasts. Its structure is completely resistant to enzymatic destruction inside the phosphate and carbon bonds: P-C-P. Bisphosphonates have a high affinity with mineral bone and once these drugs are absorbed, they are incorporated into the bone matrix. Bisphosphonates are potent inhibitors of osteoclasts and they stop the



bone remodeling process. The latest generation of these drugs, such as Alendronate and Risendronate represent the most powerful bisphosphonates since in their chemical structure they contain nitrogen. The general structure of bisphosphonates is quite easy to be modified, so that the different generations of bisphosphonates vary greatly depending on their biological, therapeutic and toxicological characteristics. The half-life of bisphosphonates in the bloodstream is very short, ranging from 30 minutes to 2 hours, but once absorbed by bone tissue, they can persist for more than 10 years in skeletal tissues.

Materials and Methods: The strategy followed to develop the research project began with an extensive bibliographic review of scientific articles found in the MedLine database (PubMed) that included almost all the articles related to the topic of Bisphosphonate-induced Osteonecrosis of the Jaws from 2007 to today.

Results: The knowledge of the relationship between bisphosphonates and oral tissues is essential for the dentist in order to understand and provide adequate dental treatment to his patients who are under this therapy. Bisphosphonates make possible to treat successfully the underlying pathology of these patients that's why their use is, and will continue to be, extremely useful. But the incidence of adverse effects might be higher in the future as the population with osteoporosis and with prolonged exposures to bisphosphonates increases, that's why an exhaustive anamnesis is important for the correct filling of the clinical history. This way the approach is always preventive. The prevention of avascular osteonecrosis is the best treatment for this new clinical entity. The treatment of osteonecrosis should be conservative to the extent that the conditions of each case allow it. Surgical treatment is the last option whenever conservative treatments are ineffective. A continuous dental evaluation must be mandatory in all patients who are going to start treatment with bisphosphonates. Permanent monitoring of these patients is strictly recommended in the dental consultation and the participation of the dentist in a health team is essential to improve the quality of life of these patients.

Conclusions: In this work a review of the most recent researches about the stomatological management of patients under treatment with bisphosphonates has been made. The elements to establish the diagnosis of maxillary osteonecrosis induced by these drugs are described as well as the relationship between dose and duration of treatment with these drugs and osteonecrosis of the jaws, the location and duration of the lesions, histopathological findings, and treatment of this condition. It is very important that dentists, dental specialists and all health professionals handle the basic principles of the prevention of bisphosphonate osteonecrosis, taking meticulous

medical records and establishing interdisciplinary management in patients susceptible to suffering from the disease. In this way erroneous, misinterpreted or late diagnoses will be avoided as well as failed treatments that might worsen the patient's health. Moreover it's advisable that all health professionals keep constantly updated because there are unclear points about the pathophysiology of the disease. This way the risks of osteonecrosis due to bisphosphonates can be reduced.

Risk factors for peri-implantitis in implants inserted in augmented maxillary sinuses: a multicenter retrospective investigation with up to eighteen years of follow-up

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Aim: To evaluate the prevalence of peri-implantitis in implants inserted in augmented maxillary sinuses and to analyze possible risk factors.

Methods: A retrospective cohort study was conducted in four centers including patients who underwent lateral or crestal sinus augmentation and received dental implants before January 2018. All patients whose medical charts and previous radiographs were available were recalled. Clinical records and periapical radiographs of patients attending follow-up visits were collected using a standardized form. Univariate logistic regression analysis for both implant-level and patient-level variables was applied. In addition, a multivariate multilevel mixed effects model with random slopes was built including most significant variables of the univariate analysis. The predictive capability of the best fitted model was analyzed by means of the receiver operating characteristic (ROC) analysis.

Results: 158 patients (62 males, 96 females; age range: 20–80 years; mean: 55.0±11.5 years) with 315 implants inserted into augmented maxillary sinuses with a follow-up varying from 1 to 18 years were examined. Seven implants (2.2%) in 7 patients resulted previously lost for peri-implantitis. Peri-implantitis was diagnosed in 24 implants of 14 patients (7.6% and 8.8%, respectively). Among the considered variables, history of periodontitis, cemented restorations, sinus

elevation with lateral approach and implant placement contextual to sinus augmentation procedures resulted significantly correlated with the presence of peri-implantitis at the multivariate analysis. The model showed good prediction performance with a value of area under ROC curve of 0.9142.

Conclusions: From the data of the present study, history of periodontitis and cemented restorations confirmed their well-known role of risk factors for peri-implant pathologies. In addition, both lateral window approach and the insertion of implants contextual to sinus augmentation procedure seem to represent significant risk factors for peri-implantitis. The reduction of vascular support to the residual bone crest (due to extended full-thickness flap and to the bony window removal), together with the cortical compression necessary to stabilize the implant in reduced bone height, could cause early marginal peri-implant bone loss and favor the onset of peri-implant pathologies.

Surgical strategy for extraction of impacted mandibular third molars positioned below the inferior alveolar canal: case series

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Aim: The inferior alveolar nerve usually represents an important anatomical limit that may influence the success of the surgery of the impacted lower third molar. Regarding the relationship of the impacted lower third molar with Inferior Alveolar Canal (IAC), a new operative classification identifies three major types of third molar positions and, based on them, suggests an intra-oral approach for the first two groups (TMC I, TMC II), while an extra-oral approach is recommended for the last group (TMC III), which refers to a third molar completely localized below the IAC. This paper presents a case series of TMC III treated with a minimally invasive extraoral surgical approach combined with piezo-surgery.

Methods: Three patients referred to the oral surgery division of the University of Campania Luigi Vanvitelli presented impacted mandibular third molars, close to the lower mandibular margin and entirely below the IAC, therefore classified as TMC III. Due to their ectopic position, surgical extraction with a minimally invasive extraoral submandibular approach combined with piezo-surgery has been proposed to each of them. The skin incisions were executed 2 cm below the lower mandible border, between the angle and 3 cm ahead of the masseter muscle (Risdon's procedure), in length reduced to approximately 2 cm if compared

with literature (4–5 cm). After soft tissue dissection, periosteum detachment and osteotomy was performed using a piezoelectric device (Piezosurgery Touch, Mectron, Italy) with PR2 and OT12S inserts. This type of approach was used to reduce the risk of resection of marginal mandibular branch of the facial nerve (CN VII), facial artery and vein, and submental artery. The extraction of the impacted tooth was successfully performed. The periosteum and the muscle bundles were sutured in layers. The skin was sutured by intradermal technique using monofilament nylon thread for maximum cosmetic benefit.

Results: The presented cases were efficiently resolved with a minimally invasive extraoral approach combined with piezo-surgery. In none of the surgeries there were peri and post operative complications and none of the patients showed signs of nerve lesion (facial nerve and inferior alveolar nerve) in the post-operative period.

Conclusions: The choice of mini-invasive extraoral submandibular surgical approach can be a valid and justified surgical-therapeutic option in the management of ectopic impacted lower third molars localized at the angle and lower margin of the mandible or when it is completely localized below the IAC and so inferior alveolar neurovascular bundle could be damaged to reach the tooth with an intra-oral approach. Advantages of this approach include the reduced possibility of injuring the inferior alveolar nerve, the good exposure of the surgical site and the reduced bone loss caused by osteotomy, because the target is closer to surgical access site. The major disadvantages of this technique include the possibility to injury to vessels and nerves (CN VII, facial artery and vein, and submental artery) during the incision of soft tissues or during the use of bone-drill handpiece for osteotomy and odontotomy, and the cosmetic sequelae of the skin scar. The first one can be avoided through a careful surgical planning and improving the surgical technique with the use of piezoelectric device for periosteum detachment and osteotomy in order to decrease the peri-operative complications and morbidity. The cosmetic sequelae of the skin scar can be avoided identifying the "skin crease" referring to Langer lines, and using an intradermal aesthetic suture in order to avoid post-operative scarring.

Antibiotics and probiotics for non-impacted tooth extractions

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Aim: A controlled, parallel, single-blind, randomized



clinical trial was performed to evaluate usefulness of antibiotics in preventing pain and complications after tooth extractions and benefits of probiotics in reducing gastro-intestinal symptoms associated with antibiotic therapy.

Materials and Methods: A total of 159 patients were enrolled in this trial. All patients included referred for tooth extraction to the Unit of Dentistry and Oral Surgery of the University Hospital of Pisa. Inclusion criteria were: need for tooth extractions; age older than 18 years; ability to understand and to sign a consent form. Exclusion criteria were: contraindications to oral surgery; need for a prophylactic antibiotic treatment; third molar or impacted tooth extractions; treatment with immunosuppressive agents or patients immunocompromised; treatment with anti-angiogenic medications; irradiation to head and neck area; uncontrolled diabetes; pregnancy and breastfeeding; drug and alcohol addiction; psychiatric disorders; allergy to penicillin and probiotic. After tooth extractions, patients were randomly allocated to one of the three study groups: group 1 received postoperatively amoxicillin + clavulanic acid; group 2 received the same antibiotic therapy with an adjunctive probiotic treatment (Lactoferrin and Bifidobacterium longum) and group 3 received neither antibiotics nor probiotics. The antibiotic was administered orally in the dose of 1 g every 12 hours for 6 days starting from the day of the extraction. The probiotic was orally administered in two capsules a day preferably without food. Follow-up visits were planned at 7, 14, and 21 days after tooth extractions (T1, T2, and T3), and parameters assessed were pain, presence of abscess, edema, fever, alveolitis, trismus, pain, difficulty in daily routine activities, and gastro-intestinal symptoms.

Results: 150 patients were analyzed. No statistically significant differences were found among demographic data between the three groups. The number of patients reporting pain at T1 was significantly higher in the control group when compared to group 2 ($p=.016$), while no difference for pain intensity was observed between groups. Five patients belonging to group 3 (10%) presented with edema 7 days after the extraction, while no occurrence was observed in the other two groups. No surgical site infection was observed in any of the groups. Alveolar osteitis was detected at T1 in group 3 for two patients. No sign of fever was present in any patient at any control, and no patient showed signs of trismus or a reduction in the mouth opening. There were no statistically significant differences between the groups for difficulty in chewing, speaking impairment and difficulty in oral hygiene activities. At T1, the antibiotics groups (group 1 and group 2) experienced a significantly higher incidence of gastric symptoms as compared to group 3. At T2, there was still a significant difference in the

number of patients reporting gastric symptoms for group 1 when compared to group 3 ($p=.031$) and a difference was found between group 1 and group 2 ($p=.0046$). At T3, there was no statistically significant difference among the groups. Intestinal symptoms seemed to be tackled by probiotic administration.

Conclusions: Pain was the most important symptom in the control group. Antibiotics were not necessary after non-impacted tooth extractions, and probiotics can reduce intestinal symptoms associated with antibiotics.

Dental extractions during infliximab therapy for psoriasis, what risks and precautions? Report of a case and literature review

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Aim: To evaluate osteomyelitis and medication related osteonecrosis (MRONJ) of the jaws complications (rare but harmful) of odontogenic infections. They could be precipitated by patient's comorbidities, pharmacological therapies and oral surgery. Osteomyelitis' incidence decreased thanks to improved oral hygiene and antimicrobials, in recent years a particular form of osteomyelitis (MRONJ) broke out in relation to a wide range of medications: mostly associated to antiresorptive drugs. Several reports observed osteomyelitic/osteonecrotic oral complications during biological therapies such as TNF α -inhibitors. Infliximab (IFB) is a neutralizing chimeric anti-TNF α monoclonal antibody with immunosuppressant activity. It is employed in some inflammatory diseases (rheumatoid arthritis, ankylosing spondylitis, psoriasis and Crohn's disease). Infliximab related adverse effects include: opportunistic infections, wound healing/hematological complications, liver disease and cancer.

Materials and Methods: A caucasian 56-year old male patient attended to the oral surgery unit in autumn 2019 for the presence of multiple residual roots and decayed teeth requiring extraction. The patient had a history of hypertension and psoriasis since 1997. First line treatment for psoriasis (ciclosporine and methotrexate) resulted in hepatic toxicity, so that in 2016 the patient shifted to IFB (5 mg/kg i.v. every 8 weeks). Dental extractions were scheduled in agreement with the dermatologist after 4-5 times of drug's half-life in

order to avoid discontinuation of biological therapy and lower the risk of bony complications. Antibiotic prophylaxis (amoxicillin clavulanate 1 gr-3/die) was recommended from 2 days before to 6 days after extractions. Residual roots in maxilla were extracted in a single appointment under local anesthesia. Sutures were applied after proper removal of granulation tissue. Patient was discharged with proper pain-relieving and antiseptic topical therapy (paracetamol 1,000 mg 3/die/3-4 days, chlorhexidine gluconate oral rinse 0,2% 3/die/10 days) and followed-up at 7-15-30 days after intervention.

Results: No complications involving the extraction sites were observed. No signs nor symptoms of osteomyelitis/osteonecrosis were seen. IFB was administered 30 days after extractions when a complete mucosal healing was observed, with a 10 days' delay with respect to scheduled infusion. Patient refused to complete extraction of residual roots in mandible because of SARS-COV2 pandemic outbreak.

Conclusions: According to the literature it is not clear whether oral bony complications seen with TNF α -inhibitors should be classified as osteomyelitis/MRONJ as their incidence and pathogenesis are not well-known. Other than immunosuppression, impairment of mucosal healing and bone turnover are supposed to be impaired since TNF α was observed to play a major role in both those processes. Precautions employed in the reported case are supported by the Italian guidelines for psoriasis systemic treatments. Discontinuation of IFB was not recommended since dental extractions are considered minor surgical procedures. Other papers support additional precautions (cell blood/platelets count, PT/INR assessment and discontinuation of biologic drug prior to surgery). However, it is not clear whether these precautions should be always considered for oral surgical intervention. In the absence of controversial results, the routine tests performed during IFB therapy prior each infusion could be considered enough informative thus excluding the need of adjunctive testing. Since the list of drugs responsible of osteomyelitic/osteonecrotic complications in oral surgery is growing every year, cooperation between specialists is fundamental to achieve the goals of maintaining optimal management of underlying disease and of preventing complications linked to drugs employed.

Usefulness and reliability of flapless technique associated with CT-guided surgery to rehabilitate an ASA-III patient: a clinical case report

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Aim: To evaluate safety and effectiveness of a CT-guided surgery implant placement with flapless technique and immediate functional loading in an ASA-III patient.

Materials and Methods: This clinical case report involved a 64-year-old ASA-III patient referred by a local private dentist for an implant evaluation because of her medical condition. We examined her medical history and classified the patient as an ASA-III because of her severe systemic disease: hypertension, angina pectoris, chronic obstructive broncho pneumopathy and diabetes mellitus. Her oral hygiene wasn't good and she was a former smoker until five years ago (15 cigarettes per day). Active periodontal disease was present in different sites of her remaining teeth, as showed by periodontal diagnostic test. Moreover, pre-existing prosthetic bridges were damaged with considerable misfitting. First of all patient's dental aesthetic was evaluated, in accordance to the surgical procedures and prosthetic rehabilitation. We accurately studied: length and shape of prosthetic teeth, physiological occlusion and correct phonetic, teeth exposure when patient spoke and laughed and finally relationship between teeth and gum contour. A polyvinyl siloxane bite registration was taken. The procedure was performed under local anesthesia during continuous anesthesiological assistance (respiratory rate, pulsossimetry, CO₂capnography, ECG and non invasive arterial pressure assessment). Patient's hopeless teeth were extracted and a restorative evaluation was provided as prosthetic reference. We took the impressions of both upper and lower arches, models were mounted and a wax-up was constructed. Preexisting patient's prosthesis was drilled with a number eight round bur, at ten different points to a depth of 1mm, positioned at a different level from occlusal plane and filled with gutta-percha: these markers placed in the old prosthesis served as radiographic guides when the double-scan protocol with a cone-beam CT scanner was applied. The scans were matched by the NobelClinician® software, and patient's anatomy was combined with radiographic guide scans. Surgical procedure was based on flapless technique that let us to use local anesthesia. We used an All-on-4® concept restoration for maxilla and conventional fixed prosthesis procedures for jaw's rehabilitation. A customized NobelGuide® surgical template was ordered through the software and after fabricated via stereolithographic rapid prototyping. The Procera® Surgical Guide was placed, ensuring complete seating through the placement of three stabilization pins for maxillary arch. All implants were located with a flapless technique, that minimized postoperative pain and shortened healing time.



We placed four tilted implants in the upper maxilla. Implants were loaded with a provisional prosthesis the same day of surgery. Five months later, provisional restoration was removed; we placed into the ceramic crowns two Procera® Implant Bridge (Nobel Biocare®) frameworks, developed via a CAD/CAM technology.

Results: In this case the flapless technique allowed us to use local anesthesia. This is a fundamental advantage that can potentially quicken the healing process via a minimally invasive technique.

Conclusions: CT-guided surgery is a minimally invasive technique that allows, through a flapless approach, safer and more predictable procedures. In this case we achieved accurate implant placement and precise fit of restoration with natural looking appearance; this patient-oriented-treatment led to a reduced healing time with better compliance.

Accelerated wound healing after oral laser surgery: an observational case-control study using topical zinc-l-carnosine

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Aim: To assess the contribution of Zinc-L-Carnosine to the healing of surgical wounds after high power diode laser excision of oral mucosal lesions.

Materials and Methods: The current pilot observational case-control study was conducted including adult (≥ 18 years old) patients with negative anamnesis for diabetes and other pathologies interfering with wound healing process referred to the Complex Operative Unit of Odontostomatology of Aldo Moro University of Bari from September 2019 to February 2020. High power diode laser excision was performed using continuous wave contact technique with output emission of 7 W/cm² delivered by a 320 nm quartz fiber; the target mucosa was cooled frequently during both excision and the first 2 post-operative hours. All wounds were sutured to reduce their width. The intervention group was instructed to add a 2-minutes-lasting topical application of a Zinc-L-Carnosine compound (HEPILOR LIQUIDO) using a cotton swab directly on the wound after cleaning it via irrigation with physiologic solution (NaCl 0,9%), three times per day. Patients were followed-up at the 5th, 7th, 10th, 15th, 20th day from surgery until the complete wound closure and thereby therapy discontinuation; stitches were removed during the 7th day after surgery. All lesions underwent histological exam. The control group was built by matching each patient belonging to intervention group to another one that both underwent to high

power diode laser excision of a lesion with the same histological diagnosis and cleaned his/her own wound without the following application of Zinc-L-Carnosine. The healing period (expressed in days), overall post-operative pain (assessed using a 10 cm Visual Analog Scale) and over-infection occurrence were collected to perform statistical analysis; comparison between groups were performed setting significance level at $P < 0.05$, by using paired samples t-test because of the matching method adopted for sampling, for both healing period and overall post-operative pain.

Results: 20 patients formed the current sample, 6 males and 14 women, with an average age of 43.93 ± 19.25 years; 10 were allocated to the intervention group and 10 to the control group, each composed by 2 cases of early tongue cancer, 2 leukoplakia, 3 oral lichen planus and 3 traumatic fibroma. The mean healing period of the intervention group was of 10.60 ± 3.31 days, the latter significantly lower than 14.00 ± 3.94 days recorded in the control group ($P = .007$). No statistical difference was found between groups for overall post-operative pain (intervention's 4.80 ± 3.22 cm; control's 6.10 ± 2.47 cm; $P = .077$). Over-infections didn't occur in both groups due to patients' high compliance to hygiene procedures.

Conclusions: The current pilot observational case-control study suggested that topical administration of Zinc-L-Carnosine could be viable as additional intervention to reduce the healing period after high power diode laser excision of oral mucosal lesions.

Thoracic empyema, mediastinitis and parietal drainage as contemporary complications of dental abscess in diabetic patient: a case report

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Aim: Here we present a rare case of odontogenic abscess complication occurred in our department during Covid-19 lockdown.

Materials and Methods: A 57-year-old woman came for observation on March 7, 2020, reporting spontaneous pain in the left mandibular area. The patient was without fever and in good clinical conditions, with a positive history of type 2 diabetes mellitus. The extraoral examination showed a swelling in the left mandibular area in correspondence with the root residues of 37 and 38 whose extraction was scheduled not before having made the patient take home antibiotic therapy with Amoxicillin and

Paracetamol. After 4 days the patient showing an aggravation of the clinical conditions. Despite drug therapy, she reported worsening of left facial swelling, odynophagia, and dysphagia. Body temperature was 37.8° and hemodynamically stable. Intramuscular Piperacillin and Ketolorac were administered without observing any improvement in the following hours, the patient was then hospitalized. Glycemia was 284 mg/dl, neutrophils 81.60% and lymphocytes 11.5% of the white blood cell count. Purulent collection was surgically drained and microbiological examination revealed presence of *Prevotella intermedia*, sensitive to Clindamycin and Piperacillin. An endocrinological consultation indicated the administration of Metformin and Insulin. The purulent collection was daily drained and medicated with iodoform gauze. CT scan of March 7 showed extensive hydropneumothorax, pneumomediastinum, thoracic empyema associated to subcutaneous emphysema in the left laterocervical region, therefore a thoracic drainage was placed after exploratory thoracentesis, collecting 1,000 ml of purulent fluid. Atrial flutter with a high ventricular response took over and was treated with Amiodarone. On March 20 swelling was observed at the temporal area with consequent increase in inflammatory index (VES 67mm/h, fibrinogen 616 mg/dl), the cerebral CT contrast scan showed a left parieto-temporal epicranial collection with air component and fistulous path of the abscess that reached left masseter and ipsilateral internal pterygoid muscle. The patient, pouring in critical condition, was tracheostomized and pharmacologically sedated, then two drains were placed under general anesthesia in the retro-auricular and parietal area after removing the necrotic tissue present. Daptomycin 500 mg per day was administered parenterally for 7 days. Extraction of 3.7 and 3.8 were performed, followed by a surgical debridement of the oral-cutaneous communication which was whipped with iodoform gauze. Clinical conditions, laboratory tests (VES 24 mm/h, fibrinogen 422 mg/dl) and radiographic findings showed improvement on April 10, tracheostomy tube was removed on April 14, parietal drains and chest drainage on 20th and 24th April. The oral-cutaneous communication at the mandibular level was sutured internally with 3/0 silk.

Results: The patient was discharged on May 9 in good condition, cooperating and without respiratory problems under follow-up program.

Surgical approach of a perimplantitis with palatal epithelial-connective graft in aesthetic zone: case report

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Aim: Exposed implant surface by perimplant disease might be successfully treated with free epithelium-connective tissue graft harvested from the posterior part of the palate. The case report presented here concerns the treatment of a 3.1, 4.1 with 2 crowns on 1 exposed implant due to periimplantitis. Tissue instability has led to a prognosis for mucogingival surgery. The use of an epithelium-connective graft for the treatment of gingival recessions in the frontal sector of the lower jaw allows the achievement of functional results even if poor esthetic result was obtainable related to the restoration of the correct gingival profile of the affected dental elements. But in this case the primary outcome concerns the complete implant exposed surface coverage for stop the periimplantitis progression.

Materials and Methods: The male patient presented for the first time at the age of 40 years, with a generalized periodontal situation, which is treated with causal therapy and maintenance, up to a situation of periodontal stability, which made it possible to replace elements 3.1 and 4.1 with 2 crowns on 1 implant. At the age of 50 years, despite FMPS and FMBS <20%, he developed periimplantitis with a gingival and bone loss of 7mm on buccal side. After an adequate preoperative evaluation of the gingival tissue adjacent to the implant to be treated, mucogingival surgery was performed. A partial thickness flap was raised on the buccal aspect of the implant, using a microsurgical scalpel, granulation tissue around the implant was removed, an implantoplasty was performed using diamond bur and then the implant was brushed with a titanium toothbrush, complete removal of debris was obtained rinsing with saline solution. After this decontamination phase, epithelial-connective free gingival graft was stabilized over the receiving site with horizontal and vertical mattress compression sutures to completely cover the implant.

Results: The patient after one year showed excellent tissue stability even if with less satisfactory esthetics. At 5 years of age, the gingival architecture was still stable and showed no signs of periimplant inflammation. This was possible thanks to maintenance therapy and good adherence of the patient who had a correct oral hygiene.

Conclusions: In the presence of gingival dehiscence around implants it is possible to obtain good results using the technique of free epithelium-connective tissue graft for covering the exposed implants, provided that the characteristics of the adjacent gingival tissue are carefully evaluated during preoperative procedures. In addition, the increase in gingival thickness together with the restoration of proper gingival architecture and dental proportions



improve patient hygiene and are an excellent prerequisite for long-term stable results.

Surgical approach to a major gingival recession with palatal connective tissue graft with bilaminar technique in aesthetic zone: case report

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Aim: Nowadays the aesthetics of a smile and post-surgical comfort are fundamental requirements of modern surgery. The case presented here concerns the treatment of a gingival recession in the aesthetic area with the application of a connective tissue graft with bilaminar surgical technique. This technique allows to operate in the frontal groups with excellent results and good aesthetic results. Moreover, the patient will have a less annoying and painful postoperative course, but a great skill by operator is required. In fact, in the case of early dehiscence of the cover flap, the risk of necrosis of the grafted tissue increases exponentially.

Materials and Methods: The 20-year-old female patient, following orthodontic treatment, presents at periodontal examination a gingival recession in the buccal area, thin phenotype, class RT1 according to the Cairo classification, vestibular probing depth of 4.1 and 3.1 at physiological levels of 1 mm, but 5mm of recession in 4.1 and 5mm in 3.1 was measured. Assessing the data reported in the periodontal chart, a surgical intervention was planned using connective tissue graft from the palatal, using a bilaminar technique. After having drawn the trapezoidal flap with 1 horizontal incision at a distance from the vertex of the anatomical papillae equal to the depth of the recession plus 1 mm and 2 slightly divergent release incisions, a split-full-split flap was performed on the buccal side. A portion epithelium-connective tissue was then harvested from the palatal side using the partial thickness technique, de-epithelized for obtained a pure connective tissue graft 0.7 mm in thickness. The exposed root surface was smoothed with curettes and EDTA 24% chemical treatment for 2 minutes, removal of residues and finally de-epithelization of the surgical papillae with scalpel and microsurgical scissors. In conclusion, the graft was inserted on amelo-cement junction (CEJ), sutured the graft to the surgical papillae with vertical mattress and sling suture and closed the flap coronally to the graft.

Results: One month after the operation, a good aesthetic performance of the operated area and an improvement in the level of gingival attack was shown. At 2 months the tissue continued to mature,

stabilizing perfectly at 9 months with complete root coverage according to the outcome expected and recession equal to 0. This confirms what has been written in the literature, namely that a recession type 1 (RT1) provides healing with 100% root coverage.

Conclusions: The bilaminar technique in its latest variants has proven to be up to the most innovative surgical techniques. When the covering flap remains stable, it continues to mask the keratose-white appearance typical of healing of an exposed gingival graft years later. This improves the camouflage of the treated area compared to adjacent soft tissues and, therefore, the final aesthetic and clinical result is satisfactory.

Treatment of vertical periodontal defect with reduced interproximal space in aesthetic site: a case report

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Aim: Infra-bone defects in the aesthetic area are a challenge for the clinician who must evaluate costs and benefits of each therapy. Surgical techniques, flap designs and biomaterials have evolved over time to increase clot stability, reduce post-surgical tissue contraction and to promote periodontal regeneration. The limits of periodontal surgical techniques are determined by the anatomical characteristics of both the defect and of the interproximal space and sometimes pre-surgical orthodontics is needed to establish correct relationships among adjacent dental elements. The present case report describes a young female patient suffering from generalized periodontitis, with vertical defects in the aesthetic area and dental crowding.

Materials and Methods: A 38-year-old patient was diagnosed with Grade III and Stage B generalized periodontitis in 2019, with 60% Full Mouth Plaque Score (FMPS) and 42% Full Mouth Bleeding Score (FMBS). She smoked five cigarettes a day. Particularly critical were elements 2.1-2.2, presenting bleeding on probing, purulent exudate, II grade mobility, crowding and a vertical defect. Vestibular probing depths (PD): 4-5-7 mm on 2.1 and 6-5-7 on 2.2, palatal PD: 4-4-8 and 6-4-7 respectively. Following non-surgical periodontal treatment, general improvements were obtained in FMPS and PD with minimal gingival

recession, but in the second sextant only a partial response was obtained with persistent pathological PD and profuse bleeding. The position of the teeth, with a small and thin interdental papilla, and the shape of the defect prevented surgical accesses able to maintain adequate support and aesthetics of the soft tissues. Moreover, the patient refused pre-surgical orthodontic treatment. A flapless debridement and positioning of an enamel matrix derivative (EMD) (Emdogain FL - Straumann®) was performed aiming to improve the periodontal condition. Three months after treatment, Vestibular PD is 3-3-4 mm on 2.1 and 3-2-4 on 2.2, palatal PD: 3-3-4 and 4-2-4 respectively, and 1 mm of gingival recession was observed both vestibular and palatal, in the absence of bleeding.

Results: Periodontal vertical bony defects are associated with a risk of progression of periodontitis and eventually tooth loss. In the past treatment was based on resective surgery resulting in the removal of healthy supportive or non-supportive bone in order to eliminate the defect. Conversely, more conservative surgical approaches and regenerative surgical procedures aim to gain regeneration of periodontal attachment. Minimally invasive surgical therapy (MIST), modified minimally invasive surgical therapy (M-MIST) and single-flap approach techniques were introduced, adapting regenerative procedures to the principles of minimally invasive surgery. Pushing the boundaries of minimal invasiveness, a recent retrospective analysis has revealed a reduction in bony defect of approximately 3 mm in cases treated with minimally invasive non-surgical therapy (MINST) in non-smokers. Such improvements seem to be stable at least up to 5 years after treatment, despite a flapless approach. The effectiveness of enamel matrix derivatives in regenerating intrabony defects was demonstrated by multiple studies in the literature. In 2015 Aimetti compared flapless procedures with EMD to procedures associated with MIST flaps, obtaining similar results in the two groups.

Conclusions: The use of EMD with flapless approach may be considered an appropriate option to treat intrabony defects. Particularly, such a minimally invasive option reduces operative time and costs and could represent a first line choice in areas of high aesthetic value.

“Sausage Technique”, an effective technique for treating severe horizontal bone defects: a case report

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Aim: The alveolar ridge resorption after a tooth extraction is an inevitable process characterized by morphological alterations in both soft tissues and bone. This process can be so important that it prevents implant placement even in a single tooth extraction site. Therefore it is necessary to use bone regeneration techniques that guarantee fewer post-operative complications, reduction of morbidity, rapid treatments and low costs.

Materials and Methods: In a 68-year-old patient an horizontal and vertical contraction of the crest, mainly involving the buccal cortical bone, was observed 3 months after the extraction of the left lower first molar. In the absence one single teeth an implant supported rehabilitation was the first choice. Nevertheless, the CBCT scan showed bone resorption, at least 4 mm bone width and 5 mm bone height. Bone tissue regeneration was needed before the positioning of a dental implant. As the bone defect only involved the first molar site, the “sausage technique” was selected in order to have a minimally invasive surgery. A full-thickness flap with intrasulcular incision from the first premolar to the second molar and periosteal relief incision was prepared. A distal relief incision served to expose the external oblique line and collect autologous bone using a scraper. The receiving bone site was prepared with multiple decortication holes made with a piezoelectric instrument through a round insert. A 1:1 mixture of particulate autologous bone and deproteinized heterologous bone granules was positioned and covered by a slow-resorbing collagen membrane fixed on the ridge with titanium screws (diameter 1 mm). After 6 months, a CBCT scan revealed the presence of an adequate bone volume (width 7mm and height 13mm) in order to proceed with the implant placement. A cylindrical dental implant (height 10 mm, diameter 4.25mm) was placed and a good insertion torque was observed (>35N). Two months after placement and 1 year after crown placement periapical radiographs showed unchanged bone levels.

Results: The “sausage technique” is a term used in implant surgery to describe a minimally invasive regenerative technique first described by Istvan Urban. This technique allows the use of lower amount of autologous bone, resulting in a less invasive harvesting procedure. The “sausage technique” receives its name from the way the collagen membrane looks when it is stretched out like a skin with small screws to keep the bone graft from moving. Titanium-reinforced ePTFE membranes are still considered the gold standard in GBR, but

the problems frequently encountered in soft tissue, such as the need to remove the membrane or the high risk of membrane exposure, have supported the development and use of resorbable membranes especially for reconstruction of narrow bone defects. The "sausage technique" uses a resorbable membrane of natural collagen to completely immobilize and protect the particulate bone graft in the initial weeks of graft maturation. The lack of the titanium-reinforced membrane can be compensated for by firmly fixing the resorbable membrane on both sides, lingual/palatal and buccal. This technique immobilizes the graft material allowing the formation of the desired amount of bone and prosthetically guided implant insertion

Conclusions: The "sausage technique" represents an effective option in the presence of narrow bone defect and it implies a minimally invasive surgery with reduced operating time and costs.

Surgical management of Gardner syndrome craniomaxillofacial manifestations: a case report

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Aim: We report here a case of GS with craniomaxillofacial manifestations, where the patient is still followed-up. Gardner syndrome (GS), a variant of familial adenomatous polyposis, is autosomal dominant genetic disease which leads to the classic triad of features consists of colonic polyps, osteomas, and both cutaneous and subcutaneous soft tissue tumors, but it is also linked with dental abnormalities (impacted teeth, dentigerous cysts, supernumerary, odontomas). Among all these conditions, the most serious are gastrointestinal polyps that can shift into malignant lesions. The mutation of Adenomatous Polyposis Coli (APC) tumor suppressor gene on chromosome 5q21e22 is involved in the pathogenesis. According to the literature, it seems the maxillofacial findings often precede gastrointestinal polyps, so dental professionals play a critical role in the diagnostic flow.

Materials and Methods: A 21-year-old female patient was referred by her family physician for a painful mental swelling on the right side under finger pressure. Medical history and inspection did not help the diagnosis. Extraoral and intraoral palpation showed a hard nodule in the right lateral mental region, in proximity with the first and the second lower premolars. Orthopantomography and CT Denta-Scan were performed and revealed a small calcified mass about 1 cm near the right mental

foramen, suitable with osteoma hypothesis. The surgery was scheduled in order to eliminate the pain and started with sculpting a linear flap 1 mm below the mucogingival line, until the mental nerve was exposed and isolated. Then the lesion was identified, excised with piezoelectric scalpel and sent for histological examination. Finally, the flap was sutured with 3/0 silk wire.

Results: A year later the patient returned for left maxillary sinusitis validated by a head CT and referred another small hard mass (5 mm) in the occipital region, painful during finger pressure and sleeping, noticeable with the CT. But the radiograph examination showed also a second hard mass (1 cm) into the right frontal sinus. Activated by GS suspicion, familiar anamnesis was collected and revealed her father died of colonic carcinoma due to polyposis. The patient was made aware of the diagnostic hypothesis and directed to colonoscopy and APC gene analysis. Genetic examination showed the mutation of APC gene and the endoscopy showed colonic polyposis, so GS diagnosis was confirmed. The patient underwent total colectomy with end-to-end intestinal anastomosis. To the present day the lady is on the list for occipital lesion osteoplasty with the purpose of improving sleep quality and obviously she is in a follow-up program regarding intestinal situation.

Conclusions: Oral symptoms of Gardner syndrome are crucial for early diagnosis. In case of multiple osteomas, impacted teeth, odontomas, supernumerary and dentigerous cysts a wider anamnesis collection and follow-up should be applied. Referring a patient with one or more of these oral signs for a gastrointestinal evaluation could really make the difference for these patients' prognosis. Dental practitioners should be aware of their critical role in the survival expectation of GS patients.

Minimally invasive surgical palatal expansion in a patient with severe maxillary hypoplasia: multidisciplinary diagnostic and therapeutic path. A case report

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Aim: A prospective study is ongoing aiming to assess

the effects of orthopedic and surgical expansion (minimally invasive technique without pterygo-maxillary detachment) of the median palatine suture on functions of nasal structures, ear canals and tympanic membranes in a group of subjects with hypoplasia of the upper jaw. This surgical technique involves bone weakening cuts created with piezosurgery instruments, both in the lateral and frontal areas. After creating osteotomy lines, osteotomes instruments are inserted in order to obtain the detachment of the palatine suture. This expansion is clinically confirmed by the creation of a midline diastema, and is blocked through activation of the previously cemented palatal expander.

Materials and Methods: A grade 3 hypoplasia of maxillary bone was observed in an 11 years old boy. Orthodontic treatments had no effect due to the already ossification of palatine suture, so surgically assisted expansion therapy was needed. Therefore, the patient underwent an orthodontic-otolaryngological multidisplinar treatment and entered the study. Dental and otolaryngological treatments were performed at T0: at enrollment; T1: upon completion of the expansion of the upper jaw with the minimally invasive surgical technique; T2: 6 months after surgery. At T0 from the ENT point of view, the patient reported difficulty breathing through the nose, confirmed by rhinomanometry, and snoring while sleeping. After surgical treatment an expander was kept in place in order to stabilize the position of the hemi-maxilla during the ossification process. Improved inspiratory resistance and tympanic status were observed at T1, such results were maintained at T2 with a further slight improvement in the low-grade tympanic retractions (Sadè scale).

Results: Surgical assisted rapid palatal expansion (SARPE) increase the available space of maxilla by extending the perimeter of the upper arch. Such procedure is mainly indicated in the presence of severe covered bite in brachifacial subjects with dental crowding and concave profile. The effects of SARPE are directly involving the upper jaw with implications on both dento-facial and cranio-facial structures. The minimally invasive technique is free from post-surgery complications, such as nerve and vascular damage or comorbidities for the patient, which are instead reported in Literature when referred to SARPE technique, due to pterygomaxillary detachment. The technique of surgically assisted expansion has excellent secondary therapeutic effects on the nasopharyngo-tubal unit in patients who have reached prepubertal age and presented tubal dysventilation, recurrent otitis, tonsillitis, nocturnal snoring.

Conclusions: The minimally invasive SARPE technique represents an effective approach for the correction of sagittal deficits of the upper jaw.

Minimally invasive pre-operative diagnostic protocol for oral lesions of surgical interest: report of 52 cases

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Aim: Both fine needle aspiration biopsy and cytology are minimally invasive techniques for the pre-operative assessment and targeted surgical treatment of oral lesions involving bone and soft tissues. Despite several studies support such techniques due to their high accuracy, they are still uncommonly used in clinical practice. The aim of this study was to describe the protocol for minimally invasive preoperative diagnosis adopted by a single institution reporting five-year experience results.

Materials and Methods: The current retrospective survey collected clinical records of patients that underwent pre-operative minimally invasive diagnosis, from 2016 to 2020, which were affected by intra- or juxta-osseous lesions of the jaws or oral soft tissues lesions diagnosed by fine needle aspiration and following cytological and histological examination. All patients received clinical examination, photographic check-up, orthopantomography; computer axial tomography of intra-osseous lesions and magnetic resonance imaging of juxta-osseous lesion and oral soft tissues lesions were also performed in order to assess their tri-dimensional diameters and relation with adjacent anatomical structures. Furthermore, juxta-osseous lesions and oral soft tissues neoplasms were evaluated with high definition intra-oral ecotomography which provided a detailed images about their internal architecture. Fine needle aspiration was performed by using a mount for 20 mL disposable plastic syringe with a 22 G needle under loco-regional anaesthesia. A monolayer specimen was expressed onto glass slides and fixed with alcohol 80% spray for cytological exam with Papanicolau stain. Cytoincluded histologic exam was conducted on formalin-fixed fine frustule specimens, then embedded in paraffin and subjected to haematoxylin-eosin coloration, PAS reaction and Gomori-Grocott coloration for infections. Immunohistochemistry investigation was executed to sort out a more accurate diagnosis when required. After cytological and cytoincluded evaluations targeted surgery was performed for all lesions presenting clinic-pathological indication to excision, followed by definitive histologic exam.

Results: During the observational period, 52 patients, 55.05 ± 20.13 years old, 33 men and 19 women, underwent the described protocol. 19 intra-osseous lesions were located in mandible and 3 in maxillary



bone; 7 juxta-osseous lesions were located at hard palate; soft tissues neoplasms occurred 2 within the cheek, 1 in sub-mandibular nodes, 1 in the tongue, 2 in the soft palate, 8 in parotid gland, 1 in floor of mouth and 8 submandibular lodge. All the 22 intra-osseous lesions appeared as asymptomatic radiolucent swellings; 3 juxta-osseous lesions appeared as painful nodules of palate, while 4 were asymptomatic swellings; 9 soft tissues neoplasms appeared as nodules and 14 as swelling, none of them painful. 7 cytologic exams were non-diagnostic due to few cellularity; 6 of them were cleared up by cytoincluded reports. Comparing with histological evaluation: 14 were malignancy divided among 7 squamous carcinomas, 5 salivary adenocarcinomas, 1 non-Hodgkin Lymphoma, 1 metastasis of lungs' carcinoma; and 37 were benign lesions sorted among 8 pleomorphic adenomas, 4 other salivary adenomas, 5 odontogenic keratocysts, 1 dentigerous cyst and 2 inflammatory odontogenic cysts, 13 odontogenic abscess, 3 cervico-facial actinomycosis, 1 traumatic ulcerative granuloma with stromal eosinophilia. Cytological sensitivity was 75% and specificity 87 %, cytoinclusion sensitivity was 91% and specificity 84%: together had sensitivity of 8% and specificity of 86%.

Conclusions: Minimally invasive diagnosis via cytological and histological examination of specimens obtained by fine needle aspiration is suggested for pre-operative diagnosis of intra- or juxta- osseous lesions of the jaws and oral soft tissues lesions, allowing oral surgeons to perform targeted surgery for every lesion.

Surgical management of an apical plug failure in a traumatized maxillary incisor during orthodontic therapy

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Aim: To describe how it is possible to heal an apical plug failure using a surgical approach and consider the use of MTA as a method for creating an apical barrier to allow root canal obturation. The reported clinical case concerns the failure of an apical plug therapy as a result of an orthodontic force.

Materials and Methods: A 12 years old patient was seen for a buccal abscess related to a maxillary first incisor. A periapical x-ray exam has been taken followed by a CBCT. The antibiotic therapy has been established at the first appointment. One week later an open flap has been done to do a surgical endodontics in order

to remove the previous plug and to establish a new seal using a bio ceramic cement. The apical zone of the root has been prepared using ultrasound microtip and sealed with Bio dentin. After one week the sutures was removed and after 3 months a new X-ray film was taken. This treatment can be completed in one or two visits depending on the MTA used, thereby reducing the time needed for completion of treatment and restoring the tooth.

Results: Traditionally the treatment was focused on producing a barrier against which a root canal filling material can be placed, preventing material extrusion into the surrounding tissues. This has usually and most commonly been achieved with calcium hydroxide Ca(OH)₂ apexification technique that involves repeated and prolonged dressing of the root canal. Although this technique has been reliable and with consistent clinical outcomes, there have been recent concerns about the long-term use of Ca(OH)₂ in root canals. The technique also carries a higher risk of cervical root fractures, being related frequently to the stage of root development. This could be attributed to its hygroscopic and proteolytic properties, which induce dentinal proteins desiccation and reduces root dentinal wall modulus of elasticity, predisposing the tooth to root fracture.

Conclusions: This case report shows how it is possible to heal an apical plug failure using a surgical approach recommended best practice based on the available evidence. In the last decade the introduction of Mineral Trioxide Aggregate (MTA) has meant that an apical plug can be created by operators, which allows immediate obturation of the root canal. However, this material remains expensive and does not confer any qualitative or quantitative increase in root dimensions. In addition, an in vitro study has shown MTA has a similar dentine weakening effect to calcium hydroxide. Recently there has been a paradigm shift in the proposed treatment for such teeth. Uncontrolled longitudinal studies and randomized controlled trials (RCTs) have shown successful continuation of root canal growth following the use of Regenerative Endodontic Therapy (RET). These techniques have been suggested to harness the stem cells present at an apical area of immature incisors, allowing repopulation of the root canal with vital tissues, and continuing deposition of hard tissue and further root development.

Etiopathogenesis of jaw osteonecrosis: a literature review

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Aim: To research and analyze the potential causes of osteonecrosis, in particular those causes which are not linked to pharmacological pathogenesis.

Methods: The literature review was performed in the PubMed database, selecting and analyzing articles discussing the etiology of the ONJ, dated from 1980 to 2020.

Results: ONJ has a long history, dating back to the late 19th century, when it was first described using the term "Phossy Jaw" for workers in match factories. This osteonecrosis was caused by exposure to the toxic fumes of white phosphorus during the production of matches. In the literature prior to 2003, the onset of ONJ in cancer patients treated with radiotherapy in the head and neck area is reported with an incidence of 8.2%. Other reported cases concern chemotherapy and steroid therapies. In 2003, R.E. Marx published an article in which, for the first time, the occurrence of 36 cases of ONJ was associated with the use of intravenous bisphosphonates (zoledronate and pamidronate) in patients with multiple myeloma or metastatic breast cancer. Numerous cases of ONJ associated with the use of systemically and orally administered bisphosphonates have been published in subsequent years. From 2015 onwards, an ever-growing list of drugs that could potentially cause ONJ has been reported with varying levels of scientific evidence, such as the biological antiresorbent agent anti-RANK (denosumab) or the antiangiogenic agent anti-VEGF (bevacizumab) and the TKI inhibitor (sunitinib). Therefore, drug intake is now considered the main cause of ONJ. On the other hand, scientific evidence regarding causes of the onset of osteonecrosis which are not related to the administration of drugs or the use of ionizing radiation is scarce. As this narrative review shows, forms attributable to etiopathogenic factors of a very diverse nature have been identified. The non-drug-induced causes detected are: inflammatory bone conditions, vascular alterations, traumatic insults, destructive lesions caused by substance abuse, infectious lesions, tumor processes, bone overheating during implant surgery, use of specific dental materials and idiopathic forms.

Conclusions: The onset of osteonecrosis, in particular when unrelated to the use of drugs/radiation, is still a little known topic, in fact, in the literature there is a limited number of studies focused on it. The correct identification of the etiology plays a crucial role in the management and treatment of the patient, it is necessary to improve research and knowledge in this direction.

Non-drug related osteonecrosis of the jaws: a case report

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Aim: The presented clinical case shows a 43-year-old female patient suffering from maxillary osteonecrosis whose onset is not related to pharmacological pathogenesis.

Materials and Methods: The patient, being treated at the Dental Clinic of the IRCCS San Raffaele Hospital, was included in an operational protocol and followed during the diagnosis, the therapeutic process and the follow-up period. The patient reported a previous trauma caused by a road accident that led to the complete disjunction of the premaxilla, which was subsequently treated surgically, at another clinic, using osteosynthesis plates and screws. In the following months, a progressive exposure of the synthesis fragments and alveolar processes developed, because of the interruption of the vascular-nervous vessel. We proceeded with the anamnestic collection, the analysis of the radiographic picture, the physical examination and the collection of photographic images. It was decided to subject the patient to antibiotic therapy with Amoxicillin cpr 1g three times a day for seven days and rinses with chlorhexidine-based mouthwashes 0.2% alcohol-free to be performed 2/3 times a day, using pure product for about a minute, after the normal home oral hygiene maneuvers, with the aim of obtaining the elimination of bacterial superinfection. Surgical treatment of the lesion involved avulsion of periodontally compromised teeth and removal of exposed and movable osteosynthesis plates and screws, elevation of a full thickness mucoperiosteal flap to reveal the entire area of exposed bone and beyond disease-free margins in order to reach healthy-looking bleeding bone, surgical removal of bone sequestration and osteoplasty of the adjacent bone surface with the aim of smoothing the bone surface to avoid soft tissue irritation. The primary closure of the soft tissues was performed, through the use of absorbable sutures, in a tension-free manner and simultaneous temporary mobile prosthesis was delivered to the patient. At the end of the surgery, instructions for home oral hygiene maneuvers were carefully provided and an antibiotic, painkiller and antiseptic drug therapy was prescribed until the mucosa of the site completely healed.

Results: The patient was placed in a follow-up program to evaluate the correct tissue healing, which was



optimal. Seven months after the first surgery was performed, the presence of a sufficient amount of residual basal bone was detected at the site of the lesion. Given the patient's desire not to proceed with reconstructive surgery, it was decided to proceed with the implant-prosthetic rehabilitation of the site, exploiting the amount of residual basal bone, through the insertion of 3 implants with immediate load and screwed superstructure.

Conclusions: As far as our clinical experience is concerned, the best treatment option for the resolution of ONJ lesions consists in the surgical removal of necrotic tissue, which allows to obtain the complete remission of the disease. The surgical success makes possible the finalization of the case through implant-prosthetic rehabilitation, restoring in the patient the chewing function and providing an optimal aesthetic result, with the full achievement of the patient's expectations.

Multiple idiopathic apical root resorption (MIARR): a rare case observed in Italy

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Aim: To define the best practice to proceed in case of MIARR.

Methods: A 40-year-old Sinti male was referred to our Department complaining severe dental pain in the left maxilla. The orthopantomography revealed unusual external apical root resorption of 1.5, 2.4, 2.5, 2.6, 4.6. On clinical examination, tooth mobility was observed on 2.6 (grade 3) and 2.5 (grade 2). In the absence of decays consistent with pulpal necrosis. The patient referred that 1.6, 3.6, 3.7, 4.7 were lost because of decay. Occlusion demonstrated bilateral cross bite. No signs suggestive for acute infection were observed. Teeth 2.5 and 2.6 were extracted due to massive root resorption leading to pain and mobility. Soft tissue from the socket and alveolar bone fragments were submitted for histological examination revealing chronic non-specific inflammation in the absence of bone alterations. Endocrine disorders were ruled out as hematological and biochemical screening was within physiological ranges. There was no history of trauma nor orthodontic treatments. Gaucher, Goltz and Papillon-Lefèvre syndrome were excluded as past medical and family histories were unremarkable, Turner syndrome was excluded being exclusive to females.

Such assessments lead to the diagnosis of MIARR. MIARR is a rare condition first reported in 1930 by Mueller and Rony. Two clinical patterns of MIARR have been described: apical and cervical, the first representing most of cases reported in the literature affecting young people. In the apical pattern, resorption starts from the apex progressing towards the dental crown and leading to shortened and rounded residual root. Being MIARR an asymptomatic condition, it is most often an incidental radiographic finding. Tooth pain and mobility are observed in advanced cases. The diagnosis of MIARR is achieved after exclusion of local factors and systemic diseases. External root resorption in permanent teeth may result from several systemic and local factors. Orthodontic movement, tumors, cysts, occlusal stress, trauma, periapical or periodontal inflammation and tooth reimplantation are well known local causes of external root resorption. In the presence of multiple root resorptions systemic conditions such as hyperparathyroidism, hypoparathyroidism, hyperphosphatemia, hypophosphatemia, Gaucher's disease, Goltz syndrome, Papillon-Lefèvre syndrome, Paget's disease of bone, Turner syndrome have to be assessed as potentially involved in the pathogenesis of resorptions. Recently, multiple external root resorption has also been reported in association with systemic sclerosis.

Results: Few cases of MIARR are reported in literature, mostly describing patients from Eastern and Middle Eastern countries (mainly India and Iran), suggesting that the patient's ethnicity might be relevant to the diagnosis. Such condition is usually observed in young males and all previously reported cases were between 18 and 39 years old. The literature reports an average of 18 of teeth involved in the presence of MIARR. In the present case 5 teeth were clearly affected by external apical root resorption. Consistently with the literature showing absence of periodontitis in MIARR, the resorbed teeth showed no signs of periodontitis notwithstanding poor oral hygiene.

Conclusions: In the presence of multiple external root resorption local and systemic etiological factors have to be assessed and ruled out. If a MIARR condition is identified, treatment largely depends on symptoms, aiming at teeth preservation as long as possible.

Horizontal ridge augmentation (HRA) for mandibular defects using autogenous bone, demineralized porcine xenografts and peritoneal collagen membrane

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Aim: The aim of this study was to treat a horizontal mandibular defect through a horizontal ridge augmentation (HRA) technique using autogenous bone, demineralized porcine xenograft and peritoneal collagen membranes.

Materials and Methods: A 54-year-old ASA one female patient with partial mandibular edentulism and horizontal bone defect was enrolled and treated according to the study protocol. After performing anesthesia and trapezoidal incision, a full-thickness flap was delicately elevated buccally and lingually, in order to avoid flap laceration or perforation. Next, the mental nerve was gently isolated and the two flaps were passivated and released. The cortex was then perforated in order to increase the vascular supply at the surgical site; 50% autogenous bone, harvested from the external oblique ridge of the mandibular ramus using a bone scraper (Safescraper, Meta; De Ore srl, Verona, Italy) was mixed with 50% high porosity porcine xenograft (Z-core, Osteogenics Biomedical, USA; De Ore srl, Verona, Italy) and with peripheral venous blood of the patient. Finally, a porcine peritoneal collagen membrane (Z-matrix, Osteogenics Biomedical, USA; De Ore srl, Verona, Italy) was packed with the mix described above. It was fixed by pins and after having evidence that the surgical flaps could advance coronally without tension to cover the augmented area, a double suture (Cytoplast, PTFE sutures, Osteogenics Biomedical, USA; De Ore srl, Verona, Italy) was performed to ensure primary closure of the surgical wound. Horizontal mattress sutures were used for flap overlapping, whereas multiple interrupted sutures were used for hermetic closure of the flaps. After approximately 6 months, an orthopantomography and a CBCT were taken and the implant-prosthetic planning was performed. Therefore, the surgical site was reopened, implant sites were prepared according to the manufacturer's protocol and two threaded tapered implants (Osseotite, Biomet 3i - Zimmer, Biomax, Vicenza, Italy) were inserted in sites 46 and 47 with a torque of 25 Nmc and submerged by 0.5 mm. Finally, a connective tissue graft was taken from the maxillary tuberosity and positioned over the implants. A double layer suture was performed.

Results: Thanks to GBR approach, it was possible to satisfy the patient's request for a fixed prosthesis and allow the clinician to position the implants in an ideal prosthetically guided implant position, as confirmed by postoperative radiographs. Thanks to the connective tissue graft, it was possible to obtain an adequate quantity and thickness of keratinized tissue.

Conclusions: This case report suggests that bone augmentation using autogenous bone, demineralized porcine xenograft and a peritoneal collagen membrane could be suitable for restoration of horizontal bone defects in the posterior mandible.

Surgical enucleation of an odontogenic keratocyst: a case report

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Aim: To show the importance of pre-surgical evaluation that gives the chance to preserve the bone structure.

Materials and Methods: A 37 years old female patient presented to the Departmental Unit of Oral Surgery of the San Raffaele Hospital, directed by Prof. Raffaele Vinci, because of a multilocular neoformation in the left jaw reported by a professional examination. The patient complained of severe pain during mastication; at physical exam, tumefaction and swelling were observed. Considering the clinical and radiographic appearance of the lesion and its aggressiveness, the surgeon diagnosed with a multilocular odontogenic keratocysts. After a careful pre-operative evaluation, extraction of the 3.8 in disodontiasis was required. Since roots of 3.6 and 3.7 were included in the lesion, those elements were extracted too. The OPT detected the presence of a radiolucent lesion, with sclerotic rim and well-defined margins, associated with the element 3.8 in total inclusion. Due to the close proximity of the impacted tooth and the mandibular canal, CBCT (Cone Beam Computed Tomography) was prescribed for an adequate surgical planning. The CBCT showed a huge reabsorption of the vestibular cortical bone and a downward dislocation of the neurovascular beam, with erosion of the roof of the mandibular canal. To completely remove the lesion, an enucleation was carried out. The crestal and vestibular access ostectomy was performed using a piezoelectric handpiece with continuous irrigation. The multilocular lesion was entirely enucleated. The cavity left was finally filled with collagen sponges in order to ensure a proper hemostasis. The neoformation was fixed with formalin and then sent to the department of Histology and Pathological Anatomy of the San Raffaele Hospital for a histopathological analysis.

Results: Histological examination confirmed the diagnosis of multilocular odontogenic keratocysts, characterized by a total size of 6 cm. After 3 weeks from surgery, healing appeared to be good. At the



clinical examination, no infections and no patient's dysesthesia or paresthesias has been reported. The 12-month X-ray examination showed a proper reossification, which was in line with the current literature. Post-op monitoring shows therefore a regular follow up, with no specific complications.

Conclusions: This case report illustrates how an accurate pre-surgical evaluation allows the enucleation of extensive lesions, even in the most complex cases, without risks nor complications, giving a sufficient preservation of residual bone structure.

Approaching patients with medication-related osteonecrosis of the jaw (MRONJ): review of the literature and three case report with different surgical strategies

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Aim: Medication related osteonecrosis of the jaws (MRONJ) is an adverse effect of drugs used to treat bone diseases. Bisphosphonates represent the first choice in antiresorptive therapies, but the discovery of RANKL has led to the development of Denosumab, a fully human monoclonal antibody. The present study shows clinical characteristics and different surgical therapy in MRONJ.

Methods: Three cases of MRONJ, two related to bisphosphonates therapy (Ibandronic Acid) and one due to Denosumab. All patients were aged female with a dental trigger agent and all lesions were in posterior mandible, detected by xRay. Traditional surgical approach was chosen to treat case #1, while case #3 was treated with surgery plus Erb-YAG laser. Denosumab-related lesion (case #2) was treated with surgical approach and PRF application. Histological examination had diagnosis of MRONJ at Stage 2. Antibiotic therapy was continued for one week after surgery and symptoms regressed in all cases. A new CT was performed after 8 months from surgery for case #1, 2 weeks in case #2 and after 3 weeks in case #3, revealing a well-defined area of surgical resection with clear areas. In the end all cases at one year follow-up have no signs of relapse or recurrence appeared.

Results: In our experience all the three surgical options used gave us good results; all patients have been treated with surgery associated with antibiotic therapy and antimicrobial rinses. Moreover, in one case Er:Yag laser was also used and in another one PRF was

applied. Due to our results all the three strategies have been revealed to be effective in MRONJ treatment.

Conclusions: Dentists should be aware of the potential risk of developing MRONJ for patients who take or had taken antiresorptive drugs. The side effects of Denosumab and bisphosphonates are partly overlapping and currently there is still no consensus about the therapeutic surgical options. Prevention and early detection of the lesions should be the primary strategy.

Therapeutic option to sinus lift: tilted implant in basal bone

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Aim: Resorption of the alveolar process mainly begins with the loss of dental elements, complicating the conventional implant rehabilitation. In many cases it's necessary subject patient to invasive procedures such as maxillary sinus lift and bone graft. Tilted implants are increasingly used for the rehabilitation of edentulous patients achieving primary stability in immediate loading procedures. This work illustrates the use of tilted implant for the rehabilitation of a patient not candidate to maxillary sinus augmentation surgery.

Materials and Methods: A 72-years-old female patient was referred to the Department of Dentistry of the Vita-Salute San Raffaele University. Orthopantomography and CBCT revealed severe maxillary atrophy. The pneumatization of the maxillary sinus had considerably reduced the bone height in molar region. Medical anamnesis revealed smoker patient and chronic sinusitis, excluding the possibility of sinus lift and bone graft. In local anesthesia, extraction of 1.3,1.6 and preparation of implant sites were carried out. Osteotomy was performed with a tangential course to the wall of the maxillary sinus: this inclination allows to obtain an emergency of the implant platform at the level of the second premolar. Motor was driven by a contra-angle at low speed (20–50 rpm) and controlled torque (30–50Ncm). Implant lengths and diameters (3.3x13 mm and 3.8x15 mm) were selected according to the largest dimensions allowed by patient's anatomy, to reduce the risk of fracture for screw and implant. Extreme abutment has been screwed on tilted implant in order to correct disparallelism up to 45°. Patient was discharged with a temporary prosthesis that will maintain until successful osseointegration. After 6 months from the surgical phase, reached tissues stability, the design of the final prosthetic device was carried out.

Results: This technique allowed the insertion of longer

implant, thus increasing the bone-implant contact area and the primary stability. The analysis of the finite elements on individual tilted implants show stress on the surrounding bone; however splinting implants with fixed prosthetic structures reduce stress on peri-implant bone at a similar level on axial implants. No surgical complications were reported in the present study and none implant was lost at two years follow-up.

Conclusions: Tilted implant in basal bone therefore represents an alternative minimally invasive surgical solution for maxillary rehabilitation without the use of bone grafts. An effective recall program is important to early intercept and correct prosthetic and biologic complications in order to avoid implant and prosthetic failures.

Vertical ridge augmentation (VRA) with Ti-reinforced d-PTFE membranes or Ti-meshes and collagen membranes: 1-year results of a randomized clinical trial

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Aim: To evaluate the quality of hard and soft tissues around implants placed in posterior mandible 1 year after vertical ridge augmentation (VRA).

Materials and Methods: 40 patients with vertical defects were enrolled and treated according to the study protocol. Patients were randomly divided into two study groups: reinforced-PTFE membranes (Cytoplast Ti-250 XL, Osteogenics Biomedical, USA; De Ore srl, Verona, Italy) (group-A) and titanium-meshes (Trinon, De Ore srl, Verona, Italy) covered by collagen membranes (Osseoguard, Zimmer Biomet, Florida, USA) (group-B). Grafting material for bone regeneration was prepared mixing 50% autogenous bone harvested from the external oblique ridge of the mandibular ramus using a bone scraper (Safescraper, Meta, De Ore srl, Verona, Italy) and 50% allograft bone (EnCore 50:50, Osteogenics Biomedical, USA; De Ore srl, Verona, Italy). All patients received simultaneously tapered implants with double-variable thread designs, conical connection, and a double-acid-etched (DAE) surface (BT SAFE; Biotec srl, Vicenza, Italy) which were evaluated after

prosthetic restoration at baseline and after 1 year, using the following parameters: pocket-probing-depth (PPD), bleeding-on-probing (BoP), plaque-index (mPI), gingival-index (mGI), keratinized-tissue-thickness/width (tKT and wKT), fornix-depth (FD), interproximal-bone-peaks (IBP) and peri-implant-bone-levels (PBL). Statistical analysis was performed to investigate any statistically significant differences and/or correlations ($P=0.05$).

Results: 30 patients were completely followed-up according to the study protocol. After 1 year, implants showed a change of PBL from 0.12 to 0.76 mm, with marginal bone loss of 0.67 and 0.61 mm for group A and B, respectively, without significant differences ($P>0.05$). Statistical analysis revealed strong correlations between PBL and IBP ($P<0.0001$). However, no significant differences were observed for PPD, mPI, mGI, tKT, wKT, and FD ($P>0.05$).

Conclusions: Considering the limitations of this short-term randomized clinical trial, the results confirmed that both bone augmentation techniques are suitable for VRA in the posterior mandible. In both groups, hard and soft tissue were stable after 1 year of follow-up, with a peri-implant bone loss less than 1.0 mm in the first year. However, medium- and long- term data are needed to validate these results.

The role of serological parameters on marginal bone level change of implant-prosthetic rehabilitations in HIV+ patients

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Aim: The advent of new and effective antiretroviral drugs has transformed a fatal disease into a chronic disease, giving negative viremia values and a life expectancy similar to healthy subjects. The aim of the present study was to evaluate the influence of serological parameters of these patients on marginal bone level change of inserted implants.

Methods: Patients were included in the study following specific inclusion criteria such as regular monitoring of serological parameters, compliance to antiretroviral therapy and good oral hygiene. Marginal bone level change was recorded after 6 months, 12 months, 36 months and 60 months since implant placement and related to serological parameters such as CD4+ level count, CD4/CD8 ratio and HIV-RNA. Depending on clinical needs, single rehabilitations or All-on-4[®] rehabilitations were performed.

Results: At the end of the study, 284 implants were positioned in 83 different patients, divided into 160 implants for single rehabilitations and 124 implants for 31 All-on-4® rehabilitations. High survival rates (95,42%) were recorded and implant failure occurred in 10 patients, with an overall number of 13 lost fixtures. The main cause was primary infection and failure in the osseointegration process. In single rehabilitations, mean marginal bone level change measured after 6 months were 0.51 ± 0.29 mm, after 12 months were 0.79 ± 0.35 mm, after 36 months were 1.18 ± 0.42 mm and after 60 months were 1.55 ± 0.28 mm. In All-on-4® rehabilitations, mean marginal bone level change measured after 6 months were 0.52 ± 0.21 mm, after 12 months were 0.73 ± 0.29 mm, after 36 months were 1.16 ± 0.33 mm and after 60 months were 1.53 ± 0.32 mm. A statistically significant linear correlation ($p < 0.05$) was found between marginal bone level change and HIV-RNA, in single rehabilitations after 36 months. A statistically significant negative correlation ($p < 0.05$) was found between marginal bone level change and CD4/CD8 ratio, in All-on-4® rehabilitations after 6 months. Moreover, the serological parameters have been proved to be of primary importance in monitoring the infection and the response to antiretroviral therapy.

Conclusions: Within the limitations of the present study, implant-prosthetic therapy in HIV-positive patients with stable and pharmacologically-controlled disease showed to be a predictable therapeutic option, with similar results to healthy patients, if a good home oral hygiene was maintained and patients were included in a professional maintenance protocol.

Trans-sinus dental implants as alternative in posterior edentulous maxilla rehabilitation: case report and literature review

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Aim: In maxillary long-term edentulism, a reduced residual bone height could interfere with axial implants placement, due to alveolar ridge resorption and maxillary sinus pneumatization. In order to increase residual bone height, several therapeutic alternatives as grafting procedures and sinus floor elevation techniques, via transcresal or lateral approach, have been proposed. Although good long-term results have been reported, high morbidity and complications during and next surgical treatment could occur. In order to promote implants' placement in basal bone,

tilted implants have been proposed as possible therapeutic alternative. When trapezoidal section area between canine root and anterior sinus wall, due to maxillary sinus mesial expansion, is too reduced for tilted implants with 45-degree inclination placement, trans-sinus dental implants could represent a possible surgical alternative as they have same advantages then traditional angulated implants. The aim of this paper is to show a case report in which trans-sinus dental implants were applied as solution in case of traditional implants failure in significant bone atrophy.

Materials and Methods: In June 2015, a 53-years old Caucasian man came to Oral Surgery Department of San Raffaele Hospital, Milan, Italy, reporting pain and suppuration in posterior sectors of atrophic maxilla. Clinical examination and radiographic evaluation proved failure of fixtures placed in 1.7 and 2.5 sites and endodontic impairment of 2.3 tooth. According with clinical and radiographical results, fixtures placed in 1.7 and 2.5 would be removed and the tooth 2.3 would be extracted. In order to ensure fixed rehabilitation of posterior edentulous maxilla, a CBCT was required to evaluate bone height, thickness and density. As a reduced bone height was identified (less than 5 millimeters), according with an unfavorable conformation of maxillary sinus cavity, trans-sinus dental implants placed in 1.6 and 2.7 sites were selected as therapeutic alternative to sinus floor elevation with lateral approach. Through preliminary traditional impressions taken one week before surgical procedure, an immediate loading was performed three hours after surgical procedure. Four months later, a the provisional prosthesis was replaced with resin implant-supported final prosthesis. Follow-up visits were performed one week after surgery, at 3 and 6 months and then once a year for the next 4 years. Intraoral x-rays were made in order to observe distal and mesial marginal bone loss around every implant. The outcomes were implants survival rate, marginal bone loss and intra and post-surgical complications related to trans-sinus dental implants inserted in 1.6 and 2.7 sites. The patient was subjected to professional oral hygiene sessions every four months in order to reduce bacterial contamination and to decrease the risk of implants failure.

Results: No signs of peri-implantitis, implants mobility, radiolucent areas around fixtures, mucosal suppuration or pain were recorded during the follow-up period. Marginal bone loss was in line with several results reported for traditional straight implants. No complications, neither intra nor post-operative, were recorded.

Conclusions: Within the limitations of this study, as suggested by several Authors, trans-sinus dental implants supporting fixed prosthesis could represent a predictable alternative to sinus floor elevation and bone grafting procedure in posterior edentulous

maxilla rehabilitation. It could be considered a viable surgical option when anterior sinus wall' conformation does not allow traditional tilted implants' placement.

Eagle's syndrome, from clinical features to diagnosis: a case report

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Aim: The purpose of this study is to present a clinical case of lingual paresthesia, in a patient affected by osteogenesis imperfecta, probably due to Eagle syndrome.

Materials and Methods: A 45-years-old woman was referred to the San Raffaele Dentistry Department for a right lingual paresthesia and swallowing pain. The patient was affected by osteogenesis imperfecta since birth. The conventional intraoral examination did not provide additional information, except for symptoms reported by the patient. A panoramic X-Ray revealed the presence of an apical osteolytic lesion at 4.7 dental element and an impacted third lower molar, as well as an elongation of the styloid process. To rule out the dental cause for the lingual paresthesia, II level (CBCT) radiographic exam was demanded before the extraction of 4.7 and 4.8 dental elements.

Results: The non-regression of symptoms without an evident dental problem associated with the concomitant lengthening of the styloid process, suspected in OPT and confirmed by CBCT, suggested the diagnosis of Eagle's Syndrome. It has been hypothesized that the pain deriving from the elongated styloid process may be due to compression of the lingual nerve. The patient was subjected to conservative therapy for four months, with poor results. Then she was informed about the possibility of surgery, but for personal reasons did not agree.

Conclusions: Idiopathic unilateral pain, especially in adult women and when it is not responsive to painkillers, could suggest clinical manifestations of Eagle's Syndrome. Moreover, the worsening of the pain by crying, yawning and swallowing should help in diagnosis. Treatment strategies include medical management (analgesics, corticosteroids, antidepressants and anticonvulsants) and various surgical approaches (extraoral, transoral, endoscopic assisted). The current literature on ES is reviewed, highlighting it's often underestimated in frequency and in clinical importance.

Analysis and evaluation of surgical procedures in the treatment of pyogenic granuloma, diode laser and scalpel compared

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Aim: In modern dentistry, use of lasers in oral surgery is increasingly a matter of debate. Recent developments in laser technology and a better understanding of the bio-interaction of different laser systems have expanded their use in clinical practice. With this study, therefore, we wanted to analyze the actual advantages of using the diode laser compared to the conventional surgical technique with cold blade in the excisional surgery of pyogenic granuloma.

Methods: The study was conducted by examining a sample of 22 patients of which 12 females and 10 males, aged between 20 and 70 years, who presented for our observation requiring the excision of the pyogenic granuloma. Through a randomized clinical study design we subjected patients in a completely random way to surgical excision of the PG, using a diode laser and cold blade. The parameters analyzed were: incision speed, duration of surgery, intraoperative bleeding, number of points and degree of patient compliance. Preliminary to the operation, histological examination was performed to confirm the diagnosis of PG, and after surgical removal of the lesion. Patients also had to fill out a subjective evaluation questionnaire regarding the surgical technique used.

Results: Both treatments were fully successful in surgical excision of PG. The diode laser treated group included 12 patients (6 males and 7 females), the cold blade group comprised 10 patients (4 males and 5 females). However, by analyzing the parameters taken into consideration, we were able to verify the advantages of one technique over the other, starting from the average speed of incision which was significantly reduced in the group of patients treated with the diode laser: 0,61 +0.29 mm/s, in the group treated with cold blade $P < 0.05$. The duration of the intervention also achieved a different result in the use of the two techniques, it was significantly lower in the group treated with a diode laser 220.89 sec compared to the group treated with a cold blade 248.70. Intraoperative bleeding in the laser group was 40%, in the blade group it was 80%. The suture was necessary in 27% of cases in the laser group, unlike the blade group where it was necessary in 40% of cases. The mean number of points was found to be 0.74 in the diode laser group and 1.26 in the blade group. Patient compliance calculated for 8.56 in the diode laser group and 8.61 in the blade group.

Conclusions: In the present study, two surgical techniques for PG excision were compared. The incision performed with the diode laser was significantly faster than with the cold blade. However, apart from the obvious differences between the etching speed of the diode laser group, there were no statistically relevant differences between the total surgeries. One reason may be due to the haemostatic effect of the diode laser which avoided intraoperative haemostasis and allowed for faster surgical excision of the PG. The use of the diode laser resulted in complete removal of the gingival surface epithelium without causing stromal damage. Therefore, the diode laser offers the advantage of a successful and safe application by being able to prevent bleeding, limiting pain and inflammation during the postoperative period and promoting healing of the gingival mucosa. These results confirm and provide new evidence that the diode laser satisfies the clinical rationale for minimally invasive approaches that reduce intraoperative and postoperative trauma.

Dental complications in the maxillary sinus

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Aim: The maxillary sinus is the largest of the paranasal sinuses. It represents a pneumatic cavity, equal and symmetrical, located inside the upper jawbone. Due to the proximity of the maxillary sinus floor to the oral cavity, approximately 30% of the maxillary sinus' infections have an odontogenic cause, in particular dental diseases not adequately treated, or incorrectly performed dental procedures on the maxillary molars and premolars. The purpose of the study is to evaluate the incidence of dental complications at the level of this anatomical structure, analyzing the most suitable pathogenesis and therapeutic strategies to be adopted in these clinical situations.

Materials and Methods: The study involved 51 patients who underwent specialist visits between January 2008 and December 2019 at the San Raffaele Hospital in Milan. The assessment of the location of a foreign body or the extent of the pathology at the sinus level and the diagnostic confirmation of the concomitant dental problem were obtained through clinical and radiographic investigations, specifically the endoral radiography, the orthopantomography and the computed tomography. Within our clinical experience, in 45 patients the treatment was surgical, especially through a combined approach: trans-oral access associated with a functional endoscopic sinus surgery

(FESS). An empirical antibiotic therapy lasting 6-14 days was prescribed in all patients. A steroid therapy was prescribed in association with the antibiotic therapy when more severe symptoms were present or when a diagnosis of chronic sinusitis was made. Where FESS intervention was requested, a night of hospitalization was scheduled. Patient follow-up was performed at 7, 20 and 60 days, by dental and otolaryngological evaluation with an average follow-up duration of 11.8 months.

Results: Of the 51 patients enrolled in the study, 52.9% were female and the average age at the time of surgery was 57 years. Three types of complications have been assessed: acute or chronic sinusitis, sometimes associated with empyema with the formation of an oro-antral fistula, implant dislocation and root cyst involving the maxillary sinus. The etiology's analysis allowed to evaluate the frequency of each cause, which in detail were the implant positioning interventions in 20 cases, followed by dental avulsions in 9 cases, carious pathologies in 7 cases, previous endodontic therapies in 6 cases, dysodontiasis in 5 cases and elevation of the maxillary sinus floor interventions in 4 cases. The microbiological cultures of the surgical samples performed on 18 patients showed in 12 cases the presence of a mixed non-specific oropharyngeal bacterial flora, in 2 cases *Staphylococcus aureus* and *Enterobacter* spp in association with *Aspergillus* spp, in 1 case *Eikenella corrodens* and beta hemolytic *Streptococci*. All surgery interventions using a combined approach were successful, accordingly with high success rates reported in literature.

Conclusions: Our results suggest that odontogenic infections are underestimated in the clinical practice, even though they represent potentially severe complications that can easily spread to the maxillary sinus due to its anatomical proximity to the oral cavity. A high alert index and effective collaboration between the specialists in dentistry and otolaryngology are fundamental for a correct early diagnosis and for an accurate treatment of these conditions, in order to avoid the onset of serious and potentially fatal complications.

Endosinusal migrated dental implants: recovery by minimally invasive approach to the maxillary sinus

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Aim: We show in this article our experience regarding

the removal of dental implants migrated in the maxillary sinus via a minimally invasive intraoral approach consisting of the creation of a bony window pedicled to the maxillary sinus membrane.

Materials and Methods: Ten patients presenting oral implants displaced into the maxillary sinus were treated between 2016 and 2020. An endoscopic endonasal examination and a CT scan evaluation of the maxillary sinus and osteomeatal complex, was always performed. The lateral bony window was performed in order to get the inferior recess of the maxillary sinus, which is the most frequent site of the displacement. The bony window was carved on the anterior wall of the maxillary sinus by a classic rotary instrument, or by a piezoelectric device. The medial, the later and the inferior side of the window are engraved in full thickness. The upper osteotomy must spare the sinonasal mucosa in order to permit the vascularization of the fragment and the perfect replacement. The window was delicately displaced outwards, thus allowing ample access to the maxillary sinus and an easy recovery of the implant. At the end of the procedure, the window was replaced and fixed by a reabsorbable suture.

Results: The implants were recovered in all cases. The vascularized bony window technique showed uneventful healing. All the surgeries were performed under local anesthesia without excessive discomfort for the patients. A CBCT was performed between 2 and 3 months postoperatively showing no signs of residual sinus infection and a complete healing of the bony margins in all cases.

Conclusions: The results from this procedure seem to demonstrate that the bony window technique is a safe and easy way to remove oral implants from the maxillary sinus under local anesthesia. The selection of the patients must be accuracy. We can treat patients with infection or inflammation confined in the affected sinus. Patients showing acute or chronic pansinusitis must be no treated with this technique because the risk of recurrence may be high. Second surgery for implant replacement or sinus lifting is possible after the healing of the bone.

Short implant: new horizon in Oral Surgery

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Aim: To evaluate the survival and success of short and super-short implants in prosthetic restorations, whether with immediate or delayed loading. In this article there are no principles of sectoral exclusion of

prosthetic restorations and all types of implants on the market and present in the literature are considered (13 articles in total).

Methods: In literature there are numerous articles concerning short and super short implants. In this review, articles from the last 15 years were considered and of these only those free from regenerative or reconstructive techniques were selected. Short implants were considered according to the following inclusion scheme: 1 implant placement in the patient's native bone only, whether maxillary and / or mandibular; 2 exclusion of incremental techniques with auto, hetero and homologous bone grafts; 3 positioning with flapless versus open technique; 4 immediate versus deferred loading; 5 implant placement in total maxillary atrophy; 6 implant placement after post-reclamation healing; 7 implants positioned in various types of skeletal atrophy according to the Kennedy classification; 8 definitive restoration with metal-ceramic, composite and/or zirconia crowns; 9 connection of the internal and/or external abutment; 10 variations in the type of implant surface by macro and micro-structure; 11 screw connection according to torque standards with dynamometric selection; 12 distinction between fixed and/or removable prosthesis. Of all the articles present in the literature, 11 publications that meet the requirements have been selected.

Results: 4,334 short implants in a total of 1,932 patients were evaluated and considered, without significant percentage changes in gender or age. Implant placement was performed equally at both maxillary and mandibular levels without significant statistical variation with regard to the surgical positioning technique. In the study, the implants considered have a length between 5 mm and 8.5 mm and a standard diameter ranging between 3.75 mm and 4 mm. From the data obtained we were able to trace only 104 short implants attributable to rough surfaces and 176 implants with machined surfaces. The articles examined consider a variable survival follow-up between 3 years and 16 years. From the data obtained and with a weighted statistical average, the survival rate after masticatory loading, both immediate and delayed, was 96.4%. This percentage indicates an excellent implant survival at 5 years with a stable maintenance of the peri implant bone peaks. No significant data emerged regarding the final prosthetic type of the crowns positioned on the implants at the end of the treatment. Furthermore, there are no data indicating with which torque method the definitive prosthetic abutments were screwed.

Conclusions: The results obtained show that short implants are an excellent fixed implant-prosthetic resolution in cases of sectorial and vertical-transverse bone atrophy, with an excellent success rate of definitive prosthetic rehabilitation therapy. However, there are currently no



significant results regarding the association between platform switching and short implants. There is also no unambiguous and accepted classification on which is, definitively, the maximum length threshold to define what is now called "short implant".

Implant rehabilitation in mandibular reconstruction after resection of ameloblastoma recurrence

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Aim: To evaluate the best treatment for patients with prostodontic implant rehabilitations treated for ameloblastoma with radical approach.

Methods: A 66 years old female patient came to our attention for an osteolytic mandibular lesion with an history of recurrences of ameloblastoma in the mandible. The patient had a partial edentulism and worn a removable partial denture, that caused pain. For this reason the patient asked for a fixed solution. At the Cone beam CT (CBCT), it was noticed important mandibular atrophy associated to a multilocular bone lesions in continuity with the inferior alveolar nerve (IAN). Based on his medical history a diagnosis of ameloblastoma recurrence was suggested. The lesion was resected and was sent to histological analysis that confirmed the diagnosis of ameloblastoma. The bone deficit was reconstructed with autologous bone blocks harvested from iliac crest fixed with osteosynthesis screws. A portion of this graft was particulated and placed to fill the gaps. Five months after the surgery, a control CBCT showed that reconstructed bone wasn't sufficient to place implants, so a second surgery was scheduled. In the second reconstructive surgery, allograft bone blocks (lifenet-health) were used and were covered with collagen membranes. After 9 months, a new CBCT was performed with radiological guide to elaborate a digitally implant planning. Dental implants (TSV Zimmer- Dental) were placed in position 4.6, 4.4., 4.2 and 3.3. The implants were uncovering after 3 months and a temporary fixed prosthesis was created. A ceramic prosthesis with a metal framework was produced as definitive restoration. The patient was followed with regular recall every 4 months for professional oral hygiene and every year for radiographic controls.

Results: Surgical management of ameloblastic lesions is often radical and causes important bone and soft tissue deficits. Due to this situation, the excision of the ameloblastoma is frequently associated to a reconstructive surgery. However, the volume of

ameloblastoma makes necessary several regenerative surgical phases. In the described case, two regenerative surgery were required. In the first approach, a bone harvested from the iliac crest was chosen for its osteoinductive, conductive and osteogenetic properties. In addition to that, it was selected because of the need to create a bone base with a good vascular trophism for the following surgeries. In the second surgery, an allograft was placed with the intention to be less invasive and lifenet-health was chosen to reduce surgical time because it is given already hydrated and at room temperature. This allograft had a biomechanical resistance and osteoconductivity similar to homologous frozen or lyophilized bone. These regenerative surgeries allowed the placement of four implants, that maintained a success and survival and survivor of 100% after 7 years. In literature, the survival average of implants placed in homologous graft is 95,3% after 4 years.

Conclusions: Prostodontic implant rehabilitations are complex solutions in patients treated for ameloblastoma with radical approach. The good result needs to be maintained of strict radiological follow up, regular hygiene recalls and clinical controls.

3dimensional models in the planning of keratocysts treatment

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Aim: To evaluate 3dimensional presurgical study in Odontogenic keratocysts (OKCs), cysts of the jaws, characterized by an aggressive behavior and high tendency to recurrence. Is, in this case, radiological exam is Cone Beam CT (CBCT) recommended? Furthermore to evaluate CAD-CAM technology which allowed the creation of 3D models of the oral cavity.

Materials and Methods: A 27 years old man was referred to our surgery department by his private dentist due to an osteolytic lesion found occasionally during a routine panoramic radiograph. The CBCT showed a wide and multilocular lesion associated with an impacted 4.8. A stereolithographic model was requested for the presurgical study and as an aid during the surgery. The presurgical planning included the marsupialization of the lesion and the extraction of the 4.8 through a lateral corticotomy as described by Alling and Alling. Presurgically, it was created an analogical surgical guide on the model to perform the cut of the bone. The histological analysis of the removed portion of the lesion showed that the lesion was OKC. During the follow up, a CBCT, performed 20 months after the marsupialization, revealed that a lobe of the

lesion has begun to grow instead of diminishing. So a second surgery was needed and a second 3D model was requested. The pre-surgical study of the 3D model highlighted that with the routine osteotomy to achieve the deeper cyst a huge amount of bone had to be sacrificed, risking a mandible fracture post-operatively. So that in general anesthesia, a sagittal osteotomy of the mandible angle was performed. The lesion was removed one lobe at time starting from the most superficial. The patient is followed with clinicals and radiographic controls and after 40 months no recurrences was noticed.

Results: 3D models are commonly used as anatomical models. In pre-surgical study, they are a valid aid both in planning and in the choice of instrumentary and it can also be used as pre-surgical simulations. In addition to that, 3D models are useful tools for new surgeon to improve surgical skills in the learning phase outside the operating room and at the same time increase the safety for the patient during surgery. Moreover, anatomical models can be used for the communication with the patient to make him more aware and informed about his pathological situation and the surgery that will be performed. An other use of stereolithographic models is related to the creation of a surgical guide or customized osteosynthesis plate. The surgical guide can be plan analogically on a printed model or can be digitally disegned and then printed. In addition there is the possibility to create and print implants or prothesis that are fixed in the patient. This is possible thanks to the development of sterilizable materials.

Conclusions: 3D technologies had in the last years a huge development and have allowed the surgeon to have more information before approaching a surgery in order to reduce operating time, have more confidence during surgery and a more predictive result. The evolutions that these technologies can be promising, but in literature there is a lack of randomized control studies that take into consideration this topic.

Mechanical properties and human histological evidence of integration of hydroxyapatite (HA) porous scaffold produced via a sponge replica method

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Aim: To evaluate morphological and mechanical features of HA scaffold, and the histologic integration in human after 4 months.

Materials and Methods: The 3D bone scaffold was obtained by sponge replica method to optimize the micro-architecture, porosity, chemical and mechanical proprieties. Cilindrical block of hydroxyapatite porous scaffold produced via a sponge replica method was used to fill 16 bone maxillary defect, in 13 patients undergoing sinus lift surgery. After 4 months, bone samples were harvested using a 4 mm diameter trephine drill and subjected to SEM, histological and histomorphometric evaluation.

Results: At SEM observation, the HA scaffold was composed by a structure with well-defined grains with an average grain size <3 microns and interconnected pores greater then 300 microns. The porosity was 85±3%. After the final sintering at 1.300 °C, the closure of pores caused a linear shrinkage of 18%. The X-ray diffraction analysis showed a highly crystalline and pure hydroxyapatite phase, without calcium oxide (CaO) and tricalcium phosphate (TCP) as secondary phases. The compressive strength, evaluated using an universal testing machine on samples with dimensions of 15x10x10 mm³, was 0.8±0.1 MPa. At histological analysis, no inflammatory reaction was detected. New bone, with large marrow space and osteocyte lacunae, formed on the surface and in the middle of the block, between interconnected pores. The composition of the samples was: 39±1% new bone, 42±3% marrow space, 17±3% residual HA and 4.02±2% osteoid tissue. In the central part of the block the new formed bone was 8±3%.

Conclusions: This study demonstrates that HA porous scaffold obtained via sponge replica method is biocompatible, promotes bone formation also between pores in internal portion, has good mechanical properties, for the preservation of the space-maintenance, and can be effectively used in treatment of maxillary bone defects.

Evaluation of temperature modifications during implant site osteotomy steel vs zirconia drill preparation by infrared thermography

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Aim: To evaluate the temperature modifications on bovine ribs during osteotomies performed by steel implant drills compared to zirconia implant drills. In fact the bone osteotomy for dental implant represents a surgical procedure able to produce on a microscale a favorable biological environment for the dental fixture into the jaws for oral rehabilitation.

The heat is a potential factor that could decrease the preservation of bone cell vitality the healing, the maturation processes and the formation of a stable bone-to-implant contact.

Materials and Methods: Standardized bone osteotomies were performed on bovine ribs by Steel cylindrical drills and zirconia cylindrical drills were investigated. A total of five drilling conditions were evaluated for each drill: after 10, 20, 40, 90, or 120 osteotomies. Bone and apical drill temperatures were measured by infrared thermography. The drilling time for each osteotomy was also calculated.

Results: Zirconia study groups showed statistically lower bone temperature compared to the Steel drills in Group 2, Group 3, and Group 4. After 120 osteotomies, the steel group showed a bone temperature of 42.45 ± 1.70 C, compared to the zirconia drills which reported average values of 40.80 ± 0.85 . A statistically significant difference was observed for drilling time osteotomy between steel implant drill and zirconia implant drills ($p < 0.01$).

Conclusions: Drill material plays an important role in thermal changes during implant bed preparation. Implant site preparation by zirconia drills could represent a useful tool for heat control during bone osteotomy in the clinical practice.

Retrospective study of a randomly selected sample of 100 patients: statistical analysis of maxillary bones lesions based on the histological results, comparison with the literature and presentation of two clinical cases

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Aim: The purpose of this study was to evaluate the prevalence of each type of maxillary bones lesion by analyzing a randomly selected sample of 100 patients treated in the last 10 years in the Department of Dentistry of the San Raffaele Hospital and to compare the results with those currently present in the literature.

Methods: Of all the patients surgically treated between 2012 and 2020 at the Department of Dentistry of the San Raffaele Hospital to remove maxillary and mandibular lesions, we have randomly selected a sample of 100 of them, in order to analyze the radiographic appearance and the result of the histopathological analysis. The main aspects evaluated in this study were the prevalence of: location (maxilla and mandible), radiological aspect (radiolucency/radiopacity), origin (odontogenic/non odontogenic) and malignancy (benign/malignant). All the results

were eventually compared to the ones present in the literature.

Results: The study showed a higher prevalence of lesions in the upper maxilla (68%) compared to the mandible (32%). In the first one, a significantly higher currency of radiolucent lesions (95.6%) has been found, with the following frequency: cysts (70,6%), benign tumors (8,8%), malignant tumors (5,9%) and lesions with no pathological material (4,4%). Considering the particular characteristics of ameloblastoma, which we encountered with a frequency of 5,9%, we decided to classify it separately from other tumors. Also in mandibular lesions the currency of radiolucency was higher (93,8%) with the following frequency: cysts (71,9%), benign tumors (12,5%), lesions with no pathological material (6,3%) and malignant tumors (3,1%). Regarding radiopaque lesions, the prevalence in the upper jaw is 2,9% for odontoma and 1,5% for osteoma; in the lower jaw odontoma was found in 6,2% of cases.

Conclusions: The results obtained showed a significant difference in the prevalence of each maxillary bones lesion. Most of the articles in the literature are in agreement with what was obtained from our study, however not such a large study was found that included all the lesions we considered. Further investigations on the subject in question will be necessary in order to create a general classification that distinguishes the various percentages obtained.

Manual and mechanical uses of osteotomes in bone compaction and expansion techniques

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Aim: To evaluate and compare advantages and disadvantages between the use of traditional surgical instruments and the new generation instruments consisting of the Magnetic Mallet through a bibliographic research, and provide the reader with the clinical indications for the surgical choice related to the bone tissue of the patient.

Results: After a literature review, it can be seen that the mechanical osteotome is a magneto-dynamic instrument that reduces complications and allows for greater safety in bone expansion and compaction techniques, compared to using the manual osteotome. With the magneto-dynamic instrument, the force generated is totally discharged at the apex of the osteotome, focusing exclusively on the treated surgical site.

Conclusions: The use of the magneto-dynamic instrument comparison with traditional osteotome

offers advantages to both the operator and the patient. However, the clinical data available are not yet sufficient to evaluate the efficiency of the magneto-dynamic instrument in bone expansion and compaction procedures, but results are encouraging to develop this methodology.

Evaluation of comfort level and satisfaction score of patients rehabilitated by self-tapping zygomatic implants

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Aim: To evaluate the comfort and the satisfaction grade of patients treated by self-tapping zygomatic implants fixed rehabilitations.

Methods: A total of 3 patients were treated in the Department of Medical, Oral Science and Biotechnologies of the University of Chieti-Pescara for severe atrophy of the posterior maxilla with implant supported fixed restorations. The clinical outcome, comfort level and satisfaction score were evaluated by a rating scale.

Results: All the patients showed no post-surgical complications without any sensory or neurological alteration related to the zygomatic implants positioning. At the baseline, the patients attributed a satisfaction score of 1 ± 0.3 . After the treatment all implants were clinically stable and a high degree of satisfaction 6 ± 0.4 was reported. After 6 months, the degree of satisfaction was 8 ± 0.4 . No cases of zygomatic failure was observed during the follow-up.

Conclusions: Zygomatic implants rehabilitation showed a high degree of patient acceptance and represents a useful alternative to more invasive regenerative approaches for the treatment of severe atrophies of posterior maxilla.

Surgical removal of an oral lipoma near the labial commissure: case report

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Aim: Oral lipoma is a benign tumor of mesenchymal origin, composed of mature adipocytes and is usually separated by a thin fibrous connective tissue capsule.

Although oral cavity is uncommon location for lipoma, the present clinical report presents it in a 40-year-old female patient.

Methods: The patient was referred to the Dentistry department of San Raffaele hospital for a lesion on left side of the lower lip, close to the labial commissure. The lesion appeared as an unilocular lesion with a well-defined margin, and the dimension were about 5x6 mm. The palpation investigation revealed a painless, non-fluctuant, round in shape lesion. Since surgical conservative management should be regarded as the best therapeutic option, we proceeded with an excisional biopsy under local anesthesia with articain 4% and adrenaline 1:100.000. The lesion was completely enucleated and then a 4/0 vycril suture was placed to close the wound and subsequently removed during the follow-up visit after 7 days. After surgery, the sample was sent to the Pathological Anatomy Department with the diagnostic hypothesis of lipoma.

Results: The histopathologic examination revealed an adipose tissue and a thin capsule surrounding the lesion, confirming the suspect of lipoma. There were no complications during and after the surgery, no sign of recurrence after 12 months with complete healing of the defect.

Conclusions: Lipoma is a benign tumor that can occur in any part of the body; its incidence in the oral cavity is very low, about 0.1% and can be found in both soft and bone tissues. The etiology of oral lipoma is unclear: mechanical factors, trauma, inflammation, obesity, endocrine system, genetic mutations, radiation, mucosal infections, and chronic irritation can contribute to its development. Histopathology remains the gold standard for diagnosis of lipomas. About the treatment, most authors considered the complete surgical excision as the main option because there is no evidence of recurrence after adequate excision. Although the literature refers only to a small percentage of lipoma, it is important to know its pathognomic features in order to distinguish it from the other oral lesions.

Surgical treatment of a mandible compound odontoma and subsequent retained premolar orthodontic recovery: case report

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Aim: Odontomas constitute a developmental defect of hard dental tissues and are classified as benign



odontogenic tumors. They are composed of all dental structures and tissues: enamel, dentin, cementum and pulp. As regards histomorphological features, two types of odontomas have been differentiated: complex and compound. Odontomas are usually detected by chance in radiographic images taken in relation to disrupted teeth eruption or mislocation. The purpose of this clinical case is to report a compound odontoma enucleation and the subsequent traction of a retained mandibular first premolar in the dental arch. This case implies orthodontic, surgical and interceptive problems.

Methods: A 15-year-old female patient was referred to the Dentistry department of San Raffaele hospital for a first dental visit. Through a careful clinical analysis, the absence in the lower dental arch of the element 3.4 was found and therefore a I and II level x-ray examinations (OPT, CBCT) were prescribed, revealing the presence of a retained lower first left premolar associated to a compound odontoma. Based on both clinical and radiological information, a specialistic orthodontic and surgical visit has been conducted. The depth evaluation of the element (compared to the physiological one), the morphology of the root and its relation with the inferior alveolar nerve, brought the clinicians to a conservative approach consisting in the surgical enucleation of the odontoma, followed by the orthodontic recovery of the tooth. Between elements 3.3 and 3.5 an open coil was activated to obtain the space necessary to the premolar recovery. Then it was possible to continue with the surgical procedure: after delivering loco-regional anesthesia, it was set up an incision and a full thickness mucoperiosteal flap to preserve the periosteal vascular-nervous structures, minimizing any postoperative pain and swellings. The corticotomy was performed through piezoelectric instrument in order to create a direct access to odontoma and the impacted premolar, allowing the preservation of soft tissues, the prevention of overheating and a better view of the operative field, thanks to the cavitation effect and micrometric cutting. The odontoma have been removed to allow traction of the element without obstacles then, an attachment was placed on the vestibular face of the crown. An SS wire was used to engage the premolar and to traction it to the arch. Finally the flap was repositioned, sutured and the recovery of the teeth continued with the orthodontic treatment until the physiological premolar location.

Results: Thanks to the interdisciplinary work of both the orthodontic and surgical specialists, it was possible to enucleate the odontoma and recover the retained element. A periodical (6 months) clinical-radiographical examination and a 10 years follow-up demonstrated the success of the therapy.

Conclusions: This clinical report shows the importance of an interdisciplinary approach to solve complex

cases. In order to do an accurate therapy of teeth impaction and retention the early interception is mandatory.

Surgical removal of an oral mucocele located on the lower lip: case report

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Aim: The purpose of this clinical report is to present an oral mucocele located on the lower lip, surgically treated by excisional biopsy in a 22-year-old patient.

Methods: The patient was referred to the Dentistry department of San Raffaele hospital for a lesion on the left side of the lower lip. After an accurate clinical analysis, we proceeded with the clinical palpation that revealed a painless, non-fluctuant, oval in shape lesion (length: 1 cm; width: 1,5 cm). The chosen treatment consisted of an excisional biopsy, including the involved accessory salivary glands under local anesthesia with articain 4% and adrenaline 1:100.000; a 4/0 vycril continuous suture was placed to close the wound and removed during the follow-up visit after 7 days. Eventually the sample was sent to the Pathological Anatomy Department.

Results: The histopathological examination confirmed the diagnosis of mucocele. At 3-years follow-up visit, still no recurrence of the lesion was observed and the lesion healed without any complication.

Conclusions: Mucoceles represent one of the most common lesions of the oral cavity, developing as a result of mucous accumulation resulting from the alteration mostly due to trauma of minor salivary glands. Mucoceles may affect at any age and is equally present in both sexes, with highest incidence in the second decade of life. The lower lip is the most frequent affected area, followed by floor of mouth, ventral tongue and buccal mucosa. Clinically, oral mucoceles are characterized by single or multiple nodules, soft, fluctuant, ranging from the normal color of the oral mucosa to deep blue. They are classified as mucous retention types (trauma) and mucous extravasation types (obstruction). Some oral mucoceles disappear spontaneously, while others are chronic and require surgical removal. Several therapeutic procedures have been described in the literature, such as scalpel excision, ablation with carbon dioxide (CO₂) and erbium-doped yttrium aluminium garnet (Er:YAG) lasers, marsupialization, and cryosurgery. If recurrence occurs, it is strictly necessary to remove the adjacent salivary gland. This

report confirmed that the diagnostic hypothesis has to be verified through a precise histopathological analysis. Moreover, the possibility of removing the oral lesion in a surgical conservative way has been demonstrated.

Evaluation of bone healing of mandibular large cystic defect treated by cortical bone lamina

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Aim: The present study aimed at described the treatment using by only Bone Lamina in bone defects residued after enucleation of mandibular cystic lesions: it evaluated the bone healing with computed analysis of postoperative panoramic radiographs and CBCT Dental scan.

Materials and Methods: A 36 year-old patient was treated at the Dental Clinic Of The Medical, Oral And Biotechnology Sciences Department of Chieti in February 2015. After clinical and radiographic visits, the patient showed radio-lucent lesion with the diameter of about 33.9x20.3mm related to the necrotic elements 4.1, 3.1, 3.2, 3.3, 3.4. The treatment provided surgical enucleation of the mandibular inflammatory cyst followed by apicectomy of the elements involved. The residual defect was covered only with a cortical bone lamina. The cortical bone lamina was adapted to the insertion site by creating a semi-rigid cover for the defect. The follow up included clinical and cone beam scans at 12 and 24 months after the cystic enucleation surgery and the new bone formation was evaluated.

Results: No intraoperative or hemorrhagic complications were reported. The healing went smoothly, also there was the filling of the residual cavity with the formation of new cortical bone inside the defect. The computed analysis of the postoperative radiographs pointed out bone regeneration of cortical in terms of thickness increase at 12 and 24 months. There was a reduction of the total volume of residual defect: at the beginning the volume of the mandibular cyst was about 3,122, 96 mm³; after 12 months 243, 6 mm³ and finally 108.5 mm³ after 24 months. The cavity volume reduction was 92,1% after 12 months and 96,53% after 24 months.

Conclusions: The cortical bone lamina technique is a useful procedure to maintain the structural integrity throughout the period required for bone regeneration. Moreover, the choice of absorbable material avoided a second surgery for its removal eliminating a potential risk for the new regenerated tissue as well as for the

patient's discomfort. In conclusion it can be said that the use of cortical bone lamina in wide residual cystic represent a valid treatment for the management of these defects.

Role of liquid biopsy in the diagnosis of potentially malignant and cancerous lesions of the oral cavity: systematic review with meta-analysis

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Aim: The purpose of this study was to systematically review the current literature in relation to the role played by liquid biopsy, and in particular the detection of microRNA as biomarkers in body fluids to discriminate OSCC/OPMD patients from healthy subjects. This study aims to answer the following question according to the PICO model (population, intervention, comparator, and outcomes): Is liquid biopsy able to play a reliable and predictable diagnostic role in the early diagnosis of malignant diseases of the oral cavity?

Materials and Methods: This systematic review is based on the guidelines of the PRISMA STATEMENT and the Cochrane Handbook for Systematic Reviews of Interventions (version 5.1.0). An extensive electronic search was completed between 10 and 18 March 2020 by consulting five electronic databases: Pubmed, Google Scholar, Scopus, Cochrane Library and Dentistry & Oral Source. The quality of the studies was evaluated using the QUADAS-2 (Quality Assessment for Studies of Diagnostic Accuracy-2) tool while the statistical analyses (sensitivity, specificity, positive and negative probability ratio, positive and negative predictive value, diagnostic odds ratio, accuracy) were calculated with the MetaDiSc (Version 1.4) and MedCalc (Version 19.2.3) software together with the respective 95% confidence intervals.

Results: The research strategy used identified 3496 articles, of which only 21 met the inclusion/exclusion criteria and were therefore included in the review. Overall, a set of 29 microRNA was evaluated for a total number of 2336 individuals (1417 OSCC/OPMD patients and 919 healthy controls) with an average age of 54.3 years (range from 37 to 75 years). The average sensitivity and specificity are respectively 75.50% (95% CI: 73.55% - 77.28%) and 75.55% (95% CI: 73.25% - 77.68%), while the overall positive and negative likelihood ratio is 3.20 (95% CI: 2.60 - 3.93) and 0.31 (95% CI: 0.25 - 0.38). In addition, the AUC value of microRNA is 0.85, demonstrating moderately high diagnostic efficacy.

Conclusions: The results achieved with this study suggest a promising diagnostic role of blood and salivary microRNA in the field of neoplastic pathology of the oral cavity and, more generally, of precision medicine. Unlike other neoplasms, liquid biopsy of the oral cavity is a technique not yet used in daily clinical practice and therefore requires multicenter, randomized and large-scale studies to validate its diagnostic applicability.

Three-dimensional evaluation of the effect of piezosurgery vs conventional drilling burs instrument on facial swelling after lower third molar surgery: preliminary results from a randomized clinical trial

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Aim: To evaluate the swelling with rotary instrument versus piezo-surgery used for osteotomy in the mandibular impacted third molar extraction using a facial reconstruction software.

Materials and Methods: A randomized, split-mouth, single-blind study was conducted on patients ranging between 18 and 40 years of age requiring lower third molars extraction and referred at the Oral Surgery Unit of the School of Dentistry of the University of Messina. 10 patients were recruited during a 2 months period according to the following inclusion criteria: good general health conditions; bilateral, symmetrical, impacted third molars; no use of medication that would influence or alter wound healing; no temporomandibular joint disorder history; no smoking. All patients underwent bilateral surgical removal. For each patient, a facial scan was obtained prior to the surgical procedures. The first extraction (control group) was conducted performing osteotomy with rotatory burs, the second one (test group) with the use of piezosurgical instruments. Facial scans were repeated at 3 and 7 days after the surgical procedures. Volumetric differences were calculated via superimposition using a dedicated software. The data obtained were processed using paired t-test.

Results: There was a significant difference in swelling between control and experimental groups ($p > 0.05$) in favor of the piezosurgery group. However, time of the procedure increased in test group ($p < 0.05$).

Conclusions: Piezosurgery is a safe way for performing the osteotomies during third molar surgery. The use of piezosurgical instrument for osteotomy is likely to reduce postoperative swelling. However, piezosurgery

took longer to complete the osteotomy than the rotary handpiece technique, increasing patient discomfort during the surgical procedure.

Preclinical and clinical applications of biomaterials in the enhancement of oral wound healing: an overview of the available reviews

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Aim: Oral surgery underwent dramatic developments in the recent years due to the use of biomaterials. The aim of the present review is to provide a general overview of the current biomaterials used in oral surgery and to comprehensively outline their impact on post-operative wound healing. The focused question was defined as: What is the clinical and histological effect of biomaterials as adjuvants of the oral surgical procedures on oral wound healing as evaluated by systematic literature reviews?

Methods: A search in Medline was performed, including hand searching. Combinations of searching terms and several criteria were applied for study identification, selection, and inclusion. The literature was searched for reviews published up to July 2020. Reviews evaluating the clinical and histological effects of biomaterials on post-operative wound healing in oral surgical procedures were included. Papers analyzing non-surgical oral procedures (e.g. orthodontics, conservative dentistry therapies) were discarded. A time limitation of a minimum of 6 weeks for the postoperative evaluation period was applied.

Results: 41 reviews were included in the final selection. The selected papers covered a wide range of biomaterials such as stem cells, bone grafts, and growth factors. Six reviews were found on stem cells topic, one considering only animal studies, three only human study, and two accounting for both animal and human studies. Twenty-five reviews were found regarding bone grafts and different surgical procedures, such as alveolar socket/ridge preservation, periodontal regeneration, atrophic jaws augmentation, sinus augmentation procedures, alveolar ridge splitting/expansion technique (ARST). Thirteen reviews were considered regarding the use of growth factors, both autologous or recombinant.

Conclusions: Bioengineering and biomaterials development represent one of the most promising perspectives for the future of oral surgery. In particular, stem cells and growth factors are polarizing the focus of this ever-evolving field, continuously improving standard surgical techniques and granting access to new approaches.