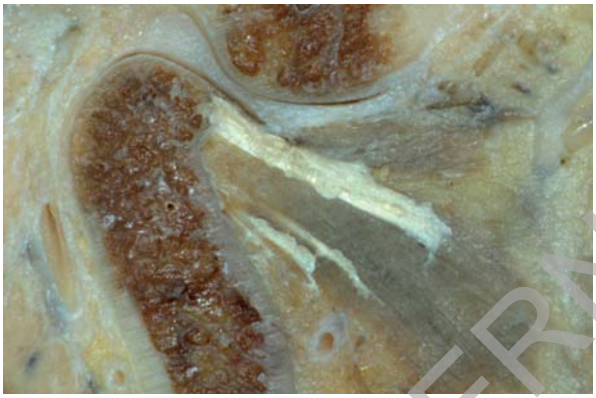
EDITORIAL

Dear Colleagues,
another season has gone and I am very pleased to be back to give you some updates on the progress and on the positive reactions following the first issue publication of "ORAL & Implantology".



The paper version, with the Italian language articles published, was the subject of a large consensus within both the university and the professional Dentistry field. Thanks to the originality, to the very accurate documentation and to the research work on which all of the articles published were based.
The English language on-line version – consultable on the web site www.oimplantology.org – has a larger visibility on a national and international level, and it permits to share the consensus regarding the paper version; additionally it has allowed us – as a litmus paper – to verify the interest arisen in the Dentistry field.
In fact just in the first week the web site was made accessible almost 93.000 accesses were recorded: the experts in the field consider those data greatly interesting.
The most read on-line articles are those on the recording of Bennett's mandibular movement and those on the prevention of implant surgery complications. Just according to those indirect requests of topics to be dealt with we would like to modulate and address our future editorial choices.
Another important point is the one regarding the lenght of the accesses, which do indicate the 'intentional' – versus the 'random' – browsing time of a web site.
We are aware we are just taking the first steps and we are not yet in the position of doing a balance of our editorial experience, both my colleagues and I we are involved in this wonderful project and we will work together in order to get consensus and more and more important results always focusing on the established objectives to be achieved: ORAL & Implantology.

Cordially and professionally

Alberto Barlattani

original article

IMMEDIATE LOADING: A NEW IMPLANT TECHNIQUE WITH IMMEDIATE LOADING AND AESTHETICS: NOBEL ACTIVE™

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SUMMARY

Immediate loading: a new implant technique with immediate loading and aesthetics: Nobel Active™

The aim of this study is to evaluate the short time aesthetic and functional outcome of a new implant system, the Nobel Active™. The Nobel Active™ features several innovations such as an extensive self-drilling capacity, axial and radial bone compression and an inward tapered collar allowing for marginal bone maintance an soft tissue stabilization. This design makes it possible to place the implant into narrower osteotomies, thus requiring less drilling, compared to conventional implants. The Nobel Active™ implants are available in two different prosthetic connections: Internal connection and external connection. The Nobel Active™ External connection is a 1.5 piece implant, with a primary abutment included with the implant. The Nobel Active™ internal connection is a two piece implant with a standard hexagonal internal connection. In this study we present a single tooth replacement with immediate loading of Nobel Active External connection.

Key words: osseointegration, immediate loading, Nobel Active™.

RIASSUNTO

Il carico immediato: una tecnica implantare con estetica e funzione immediata: Nobel Active™

Scopo di questo studio è valutare a breve termine l'esito funzionale ed estetico di una nuova sistematica implantare, il Nobel Active™, le cui caratteristiche innovative rappresentano un grande passo in avanti rispetto agli impianti tradizionali. Le sue peculiarità, quali, un'elevata capacità auto-filettante e di compressione ossea assiale e radiale, il collare conico verso l'interno, disegnato per una maggiore stabilizzazione dei tessuti molli e per il mantenimento dell'osso marginale, la superficie TiUnite®, arricchita da numerose porosità sulle spire, insieme al suo disegno, rendono possibile un facile raggiungimento della stabilità primaria ed il posizionamento della fixture anche in mascellari fortemente riassorbiti, in quanto Nobel Active™, rispetto alle tecniche tradizionali, richiede una minore osteotomia. Questo sistema, inoltre, prevede due soluzioni protesiche differenti: internal od external connection. Il Nobel Active™ External prevede una moncone primario fuso con l'impianto (one piece) sul quale andrà ad incastrarsi, mediante la sua interfaccia concava, l'abutment definitivo. Il Nobel Active™ Internal invece, presenta un classica interfaccia protesica ad esagono interno. In questo studio viene presentato un caso clinico con carico immediato di Nobel Active™ External, esaltandone l'estrema semplicità operativa nelle fasi chirurgiche e protesiche ed il ripristino funzionale ed estetico immediato.

Parole chiave: osteointegrazione, carico immediato, Nobel Active™.

Introduction

Today, immediate loading is one of the most important objective of the implant-prosthetic technique. The osseointegration, documented by now from the operators of the whole world, has allowed the realization of fixed prosthesis in patients where, up to few years before, it was nearly impossible to furnish some acceptable and comforting solutions. The success of osseointegration, however, results conditioned by the rigorous respect of the long healing time that was thought to be necessary to avoid the fibrous connective tissue interposition in the bone-implant interface (1). This causes a considerable discomfort in the post-operating period and sometimes it can even dissuade the patient to take the surgery, so it can be considered a serious limit. For this reason, the possibility to shorten the time that elapse between the surgical phase and the delivery of the fixed prosthesis has been studied more and more, leaving the Brånemark (2) classic protocol and it's rigid criterions according to which, to achieve a correct osseointegration, we had to attend at least three months for the mandible and four-six months for the jawbone. The measurement with frequency of resonance of implants bone anchorage (9) has recently confirmed that, in high density bone, implant stability doesn't increase during the healing phase. So if we have since the beginning a good stability, we can realize immediate loading with success (4). While, in low density bone, implant stability increases during the healing phase, thanks to bone regeneration around the implant, just in these cases we have to accord to Brånemark classic protocol (5). In a lot of clinical situations, osseointegration can be therefore considered as the maintenance of an elevated primary bone anchorage, rather than its formation. Just in these cases immediate loading can be applied with success. It is opportune remember that the immediate loading of implants, besides allowing a reduction of the times of the rehabilitation, it represents a great psychological and functional advantage for the patients. Recent studies on the immediate loading of single implants and bridges in both the maxillary show as, previous a careful clinical evaluation of the patient and the use of a correct surgical protocol, the obtained results are completely comparable to those obtained with the standard loading protocol (3, 6, 8, 10). The possibility to functionally and aesthetically rehabilitate the patient within an only appointment, without rehabilitation quality loosing, represents therefore the ideal solution and the made attempts in the last years by the operators are strongly addressed in this direction.

Nobel Active™

The Nobel Biocare™ AB, to achieve these results, has developed a new implant-system with an innovative design: Nobel Active™. It has been created by four dentist of international renown: Dr. Benny Karmon, Dr. Yuval Jacoby, Prof. Nitzan Bichacho and Dr. Ophir Fromovich. Nobel Active™ several innovation can be found as in implant macrostructure as in implant microstructure.
These implants have a variable thread profile that becomes wider (vertically) and shorter (horizontally) as it progresses coronally. These implants have a variable tapered thread-profile and the core of the implants forms condensing cones and not continuous lines like the body of conventional tapered implants. In the apical region the implants have a pronounced tapered body with sharp threads to facilitate insertion and cutting unprepared bone. This part of the implant is followed by a sequence of variable threads-units to allow easy insertion together with gradual condensation to achieve excellent primary stabilization even in very low density bone. The implants also have a spiral tap extending along more than half of the implant length that increase the penetrability of the implant. The coronal region adjacent to the threaded part (the collar) of the Nobel Active™ (Rp and Wp) is tapered coronally allowing elastic relapse of the bone over the implant, while the Nobel Active™ Narrow platform has a straight collar.
The nobel Active™ implants are available in two different prosthetic connections: Internal connection and external connection.
The nobel Active™ internal connection is a two-piece implant available in diameters of 3,5 mm (Np), 4,3 mm (Rp), 5,0 mm (Wp).
It can be used for every quality of bone, as in the mandible as in the jawbone and for full-arch fixed restoration, partial fixed bridge or single tooth restoration. It can be used as in the two-stage protocol as to realize immediate loading.
These implants have an internal hexagonal prosthetic connection that exclude the existence of

microgap and allow a correct prosthetic connection.
The Nobel Active™ external connection is a one-piece implant that take advantage of all the mechanical and biological benefits of a one-piece implant and still maintain the flexibility of a two-piece system. It can be available into three diameters: 3,5 mm (Np), 4,3 mm (Rp), 5,0 mm (Wp).
Abutments are friction secured to the implant shank by tapping with a mallet and removed from it with the abutment removal screw.
Abutments are connected by a locking tapered interface to this part of the implant.
From a micro structural point of view, the surface of the whole threaded part of the implant and the collar is TiUnite™ . In the Nobel Active External, the most coronal, transmucosal part of the implant, has a machined surface. Results of resonance frequency analyses (7, 11) show that the high initial stability achieved with TiUnite® surface is maintained at a high level throughout the healing phase and up to 30% higher stability than machined surface implants.

Clinical case

Male patient 27 y.o. with missing first premolar 1.4 due to trauma (Fig. 1) 2 years eralier, was threated with Nobel Active™ external connection implant system. After clinical and radiographic evaluation (Tc Dentascan (Fig. 3), panoramic (Fig. 2) and with approval from the patient, we decided to use the Nobel Active™ implants with external connection. We used a flap surgery technique (Fig. 4) with loading within 24 hours. The surgical drills that we used were as follows: twist drill Ø 2 mm, twist step-drill Ø 2,4/2,8 mm and twist step-drill 3,2/3,6 mm. The implant, a Nobel Active™ 4,3 × 13 mm was inserted at low speed of 25rpm and with a torque of 40 Ncm. The suture that we used was Seta Ethicon 3.0. Temporary crown was placed on top of the healing abutment (Fig. 5, 6). Final prosthetic solution (Fig. 10-12) was fabricated after 3 months, using traditional impression technique (Fig. 7-9). Regular check ups at 3, 6, 12 months have showed an excellent bone healing (Fig. 13).

Figure 1
Pre-operatory view.

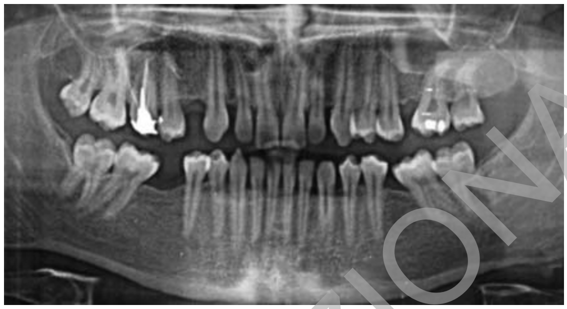

Figure 2
Panoramic.

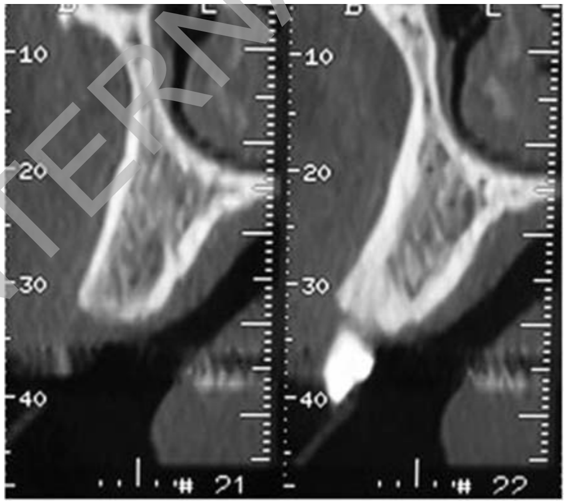

Figure 3
TC Dentascan.

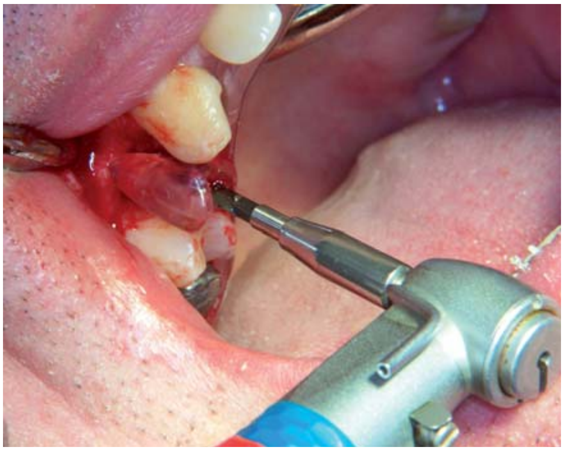

Figure 4
Surgical stent and twist drill.

Figure 5
Healing abutment on top of the fixture.

Figure 6
Temporary crown. Buccal view.

Figure 7
Transfert connected to the fixture.

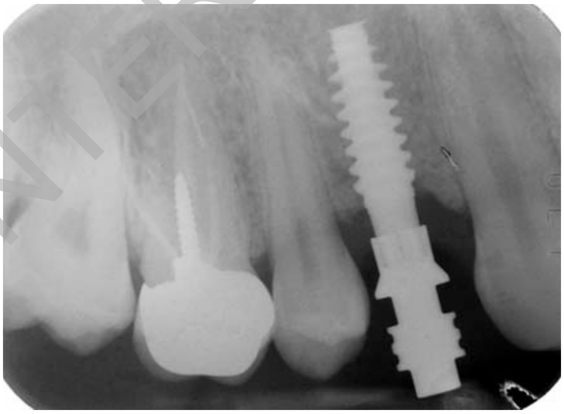

Figure 8
Rx of transfert connected to the implant.

Conclusions

Scientific articles reviewed in the last years, acknowledge immediate loading as a valid treatment alternative with the predictable results as the Brånemark standard protocol with the benefits of shorter treatment time and less dental appointments.
Since the immediate loading protocol is less traumatic and shows good results with less treatment time, without any doubt it will be well accepted by patients and therefore used in more patient treatments.

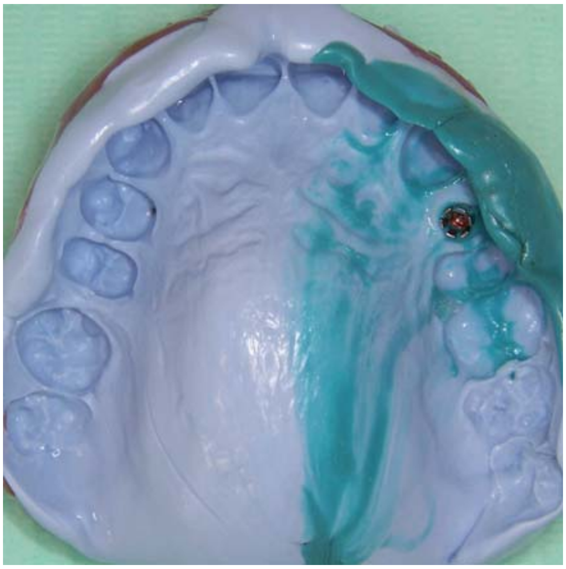

Figure 9
Final impression.

Figure 10
Final prosthetic titanium-porcelain crown. Occlusal view.

Figure 11
Final prosthetic titanium-porcelain crown. Buccal view.

Figure 12
Final prosthetic titanium-porcelain crown. Frontal view.

Figure 13
Rx 1 year follow-up.

The author's opinion is that Nobel Active™ represents an important mile stone for immediate loading, but more clinical studies should be done to improve this technique.

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ROLE OF DIAGNOSTIC IMAGING TO MALIGNANT SINUS TUMORS IN PRESURGICAL STAGING

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SUMMARY

Role of diagnostic imaging to malignant sinus tumors in presurgical staging

The aim of this study is to describe the current role of imaging in pre-surgical planning, reporting 25 cases of paranasal sinus tumors examined in our Institute. Between June 2006 and May 2008, we identified 25 patients with malignant tumors of the paranasal sinuses. All of the patients were evaluated with CT and/or MR exams. US were used to assess regional lymph node involvement. When necessary CT-PET scanning using FDG, was done. Diagnostic imaging is essential during the initial work-up of a patient suspected of having a paranasal sinus tumor. The role of imaging is to define the tumor extension, nodal involvement, metastases and recurrences in the postoperative patient. CT and MR imaging are the primary modalities employed; each have advantages and disadvantages but tend to be complementary. The involvement of fine bone structures is best evaluated with CT. In assessing the extent of the tumor, MR provides excellent soft tissue detail, allowing for delineation of neoplasm from surrounding inflammatory tissue and secretions. For evaluation of lymph node enlargement color-Doppler US, CT and MR provide morphologic data, while CT-PET provides metabolic data. CT-PET can be used to stage nodal and metastatic disease and for assessing the efficacy of therapy or recurrent disease.

Key words: paranasal sinus neoplasm, paranasal sinus cancer, CT-sinus cancer, MR-head and neck tumors, PET/CT.

RIASSUNTO

Ruolo della diagnostica per immagini nello staging preoperatorio delle patologie neoplastiche dei seni paranasali

Lo scopo del lavoro è descrivere il ruolo attuale della diagnostica per immagini nella pianificazione chirurgica, nella patologia neoplastica dei seni paranasali. Tra giugno 2006 e maggio 2008 sono giunti alla nostra osservazione 25 pazienti con tumori maligni dei seni paranasali. Tutti i pazienti hanno effettuato un esame TC e/o RM. L'esame ecotomografico è stato utilizzato per valutare il coinvolgimento linfonodale mentre un esame PET o PET/TC con FDG è stato effettuato se necessario. L'imaging radiologico risulta essenziale nella valutazione iniziale di un paziente con sospetto di tumore dei seni paranasali. Il ruolo dell'imaging è definire l'estensione del tumore, l'interessamento linfonodale e la valutazione di eventuali metastasi e recidive locoregionali in fase post-operatoria. La TC e la RM sono le indagini diagnostiche di prima istanza; entrambe presentano vantaggi e svantaggi, ma insieme risultano complementari. Il coinvolgimento delle fini strutture ossee è valutato in miglior modo dalla TC. Nella valutazione dell'estensione tumorale, la RM offre un eccellente dettaglio dei tessuti molli, permettendo la differenziazione della neoplasia dal circostante tessuto infiammatorio e dalle secrezioni. Per lo studio di linfonodi aumentati di dimensioni, l'esame eco Color-Doppler, la TC e la RM forniscono informazioni relative alla morfologia, mentre la PET permette una valutazione di tipo metabolico. La PET/TC con FDG può essere utilizzata in fase di stadiazione per valutare il coinvolgimento linfonodale o metastatico, per monitorare l'efficacia della terapia e nello studio della recidiva neoplastica.

Parole chiave: neoplasie dei seni paranasali-carcinoma sinusale, TC-carcinoma sinusale, RM-tumori della testa e del collo, PET/TC.

Introduction

The paranasal sinus tract gives rise to a large variety of neoplasms derived from a multitude of tissue types. Paranasal sinuses neoplasias can be classified as epithelial or mesenchymal. The epithelial tumors arise from the epithelial lining of the nasal and sinus cavities, the accessory salivary tissue, the neuroendocrine tissue or the olfactory mucosa, and the mesenchymal tumors arise from the supporting tissues. Carcinoma of the paranasal sinuses cavity is rare representing 3-4% of head and neck tumors and less than 1% of all malignancies (1). 80% of these tumors are squamous cell carcinoma with adenocarcinoma and adenoid cystic cancers accounting for 10%. The maxillary sinus is most commonly involved with tumor, followed by the nasal cavity, the ethmoids, and then the frontal and sphenoid sinuses.

Since the last 30 years endosseous implants are a well established treatment technique in maxillofacial surgery. Implants are used in the rehabilitation of Patients having lost parts of maxilla or mandible due to tumor surgery or which due to radiotherapy have problems tolerating mucosaborne dentures (2). This progression has been possible by the detailed information provided by imaging techniques (3).

A multidisciplinary team approach is often requested to correctly assess these tumors. The diagnosis of paranasal sinuses tumors is based on the history and physical examination. The physical examination should include a fiber optic endoscopic evaluation. Radiologic imaging is essential during the initial work-up of a patient suspected of having a paranasal sinuses tumor. These studies should be obtained prior to biopsy of the lesions to avoid surgical artefact. Plain films are inadequate for the assessment of sinus masses and a combination of CT and MR is required (4, 5).

US imaging is very accurate in assessment of nodal localization. CT-PET can be used to stage the primary tumor including nodal involvement and distant metastases, to assess the response to treatment and look for recurrence (6, 7). In this article, we describe the present role of imaging, reporting 25 cases of tumor of the paranasal sinuses that were examined in our Institute.

Materials and methods

Between june 2006 and may 2008, we identified 25 Patients with malignant tumors of the paranasal sinuses. Patients ranged in age from 20 to 85 years (mean: 56), and 60% were male. The diagnosis was based in most Patients on the history and physical examination. Plain radiographs are inadequate and rarely used. All Patients underwent CT and/or MR exams. US were used to assess regional lymph node involvement. When necessary CT-PET scanning using FDG, was done.

CT technique

Thin-section helical scan of the nasal cavity and paranasal sinuses was performed on a Volumetric 64 slices CT (Light Speed VCT, General Electric, Medical Systems, USA). CT examinations were obtained with a thickness of 0.6 mm, a 0.4-milimeter interval, rotation time of 0.5 s, 150 mA, 120 Kv, standard and high resolution algorithms for bony structures and a field of view (FOV) of 15 cm.

CT exams were performed following the injection of iodine contrast medium (Iomeron-350mgI/ml, Bracco, Milano, Italia) with volume: 100-120 ml and flow: 2-3 ml/s.

Start delay greater than 60-70 sec. are necessary.

The data acquired are subsequently sent to the workstation and processed with the dedicated software for Multiplanar Reconstructions (MPR), 3D view and virtual rhinosinus endoscopy (VRS), a new method capable of simulating the endoscopic vision obtained with optic fiber instruments.

Coronal and sagittal MPR reconstructions are helpful in the evaluation of base of the skull, the orbital floor and palate.

MR technique

The study was conducted using a 1,5 Tesla Philips Gyroscan ACS-NT MRI magnet (Philips Medical-Systems, Best, The Netherlands). Spin-echo (SE) and Turbo-Spin-echo (TSE) technique was used in the axial, coronal and sagittal planes. Axial T1-weighted [TR/TE 700/15; repetition time (TR) msec/echo time (TE) msec] and T2-weighted [TR/TE 2730/80] images were obtained. T1-weighted images were also performed in the coronal plane. Images with fat suppression (SPIR technique) are also obtained.
Axial, coronal and sagittal sections were performed following the injection of gadolinium diethylene triamine pentaacetate (G-DTPA) paramagnetic contrast material (Magnevist, Schering, Berlin, Germany).
Slice thickness are as follows: axial and coronal images, 5 mm sections with 2 mm interslice gap; and sagittal images, 4 mm sections with 1 mm gap. The imaging matrix was 192 x 256 in all scanning planes and sequences.

CT-PET technique

Imaging was performed on a GE PET/CT scanner (General Electric Medical Systems, Milwaukee, WI) a new integrated PET-CT system that combines a multi-slice helical CT with a PET tomograph. PET images were obtained from the skull base through the midthigh after intravenous administration of 370 MBq of [(18)F] fluorine-18-fluoro-2-deoxyglucose. The FDG images were recorded after 45 min-1 hour. A CT examination is used for attenuation correction of PET images. No contrast CT images were obtained with 140 kV, 80 mA, 0.8 s/CT rotation, 3.75 mm slice thickness and a table speed of 22.5 mm/s. Subsequently another CT scan was performed following the injection of contrast medium (130 ml, flow of 2-3 ml/sec, delay of 60 sec.) using 140 kV, 300 mA, 0.8 s/CT rotation, 3.75 mm slice thickness (reconstruction at 0.625 mm) and a table speed of 22.5 mm/s.
Patients were grouped into the following stages: stage I, limited to site of origin; stage II, extension to adjacent site (orbit, nasopharynx, paranasal sinuses, skin, pterigomaxillary fossa); stage III, base skull or pterygoid plate destruction and/or intracranial extension.
Twelve (48%) patients were treated with irradiation alone, 7 (28%) with surgery and postoperative irradiation, 3 (12%) with preoperative irradiation and surgery, and 2 (8%) more advanced cases with chemotherapy in combination with irradiation and surgery.

Results

Our results were divided in: histologic typing, site and staging at diagnosis.

Histologic typing (Table 1): the histologic analysis revealed that 20 (80%) of the 25 were epithelial tumors and 4 (16%) were non epithelial tumors and 1 (4%) metastatic tumor.
Of the 20 epithelial tumors, 18 were epidermoid carcinomas and 2 were malignant melanomas. Of the 18 epidermoid carcinomas, 10 were squamous cell carcinomas, 1 was undifferentiated carcinoma, 2 were adenocystic carcinomas and 5 were adenocarcinomas.
About non-epithelial tumors 3 were lymphoreticolar tumors and 1 was sarcoma. Of 3 lymphoreticolar tumors 2 were non-Hodgkin's lymphomas and 1 plasmocytoma. The sarcoma was fibrosarcoma.

Site (Table 2): tumor sites were maxillary sinus in most cases (70%), ethmoid sinus (10%), sphenoid sinus (6%) and frontal sinus (4%). In 10% of cases had extensive tumor spread, which made it impossible to determine the site of origin.
Of the 20 epithelial tumors 16 arose in the maxillary antrum, 2 in the ethmoid sinus, 2 were discovered at an advanced stage and none arose in the frontal or sphenoid sinus.
Of the 4 non-epithelial tumors 2 arose in the maxillary sinus, 1 in the frontal sinus and 1 was extensive at diagnosis. 1 metastasis occurred in the sphenoid sinus.

Table 1 - Distribution by histology: type and number of patients.		
Epithelial tumors (20 Pts)	Epidermoid (18)	Squamous cell carcinoma (10) Adenocarcinoma (5) Adenocystic carcinoma (2) Undifferentiated carcinoma (1)
	Melanoma (2)	
Non-epithelial tumors (4 Pts)	Linforeticolari (3)	Non-Hodgking's lymphoma (2) Plasmocytoma (1)
	Sarcoma (1)	Fibrosarcoma (1)
Metastasis (1 Pt)		

Table 2 - Distribution by site.	
Primary site (%)	Maxillary sinus (70%) Ethmoid sinus (10%) Sphenoid sinus (6%) Frontal sinus (4%) Indeterminate origin (10%)

Staging at diagnosis: regional nodes were involved in 15% of cases. Disseminated metastases were found in 2% of cases.

Patients were grouped into the following stages: stage I 90%; stage II, 75%; stage III, 42%. The prognosis for cases with involved nodes was severely reduced and for those with metastases it was significantly poorer.

Discussion

The role of imaging in pre-surgical staging of Patient with paranasal sinuses tumors is to define the tumor extension, nodal involvement, metastases and recurrences in the postoperative Patient.

Tumor extension

In the diagnosis of paranasal sinuses tumors MR imaging is a vital tool in the diagnosis of these lesions and is used in conjunction with computed tomography to precisely delineate the extent of these neoplasms. Involvement of the skull base, the orbits, the intracranial compartment and perineural spread of tumor are important informations in anticipation of following reconstructive implantologic treatment (8).

In assessing the extent of the tumor MR is superior to CT for its essential characteristic of best contrast resolution. Therefore, it is important to differentiate tumor from secretions and this may be difficult with CT. Post contrast scans may be helpful in distinguishing tumor from secretions and assessing orbital extent and brain involvement.

Most tumors are hypointense or hysointense on T1 images, slightly higher signal intensity on T2 weighting images and enhance with a solid pattern after contrast administration when compared with muscle or brain. Secretions are of high water content and are hypointense on T1 weighting and higher signal intensity than tumors on T2 weighting and mucosal disease shows similar characteristics with peripheral enhancement after contrast medium.

Small tumors are often indistinguishable from adjacent secretions and may be missed but larger tumors are usually associated with bony changes, which may be helpful in diagnosis. In fact, radiologists are reluctant to diagnose a tumor in the absence of adjacent bone involvement.

The involvement of fine bone structures is best evaluated with CT (9) thanks to its excellent spatial resolution (Fig. 1). CT provides excellent details about the thin bony paranasal sinuses walls separating the ethmoid from the anterior skull base and the orbit (3).

In addition, with new CT scans, which work with slip-ring technology and multiple detector rows, acquisition time is ulteriorly reduced and movement artifacts are quite completely suppressed improving images quality. Therefore, multislice-CT offer advanced reconstruction algorhitms such us multiplanar reformatting, 3D reconstruction and virtual rhinosinus endoscopy that permit a more precise measurement of the mass size and a best pre surgical evaluation and virtual post-surgical result (10, 11).

Bone involvement can cause aggressive changes, commonly seen in squamous cell carcinoma. This pattern produces invasion and irregular destruction of the bone with only small fragments remaining. If tumor growth is slow the pattern can we see is bony remodeling.

Either CT and MR angiography techniques or ecocolor-Doppler US are enable to show direct infiltration of vascular adventitia, so the radiologic criterium for vascular involvement is the surrounding of more than 270° of vascular wall circumference.

Orbital invasion is a very important parameter to assess because it alters surgical planning radically. If the periosteum is involved orbital exenteration is required, whereas if the periosteum is intact the eye can be preserved and the risk of local recurrence is reduced (12). In presence of bony destruction and involvement of the orbital fat we can confirm certainly orbital invasion (Fig. 2). However, in absence of these signs neither CT or MR can exclude invasion with reported positive predictive values of 80% (MR) and 86% (CT) (13).

MR is superior to CT in assessing perineural spread and intracranial extension. With contrast enhanced T1 weighted in coronal and sagittal views we can see the destruction of the cribriform plate and the enhancement of dural envelope that confirm intracranial invasion (Fig. 3).

Nodal involvement

For evaluation of lymph node enlargement Ecocolor-Doppler US, CT and MR provide morphologic data, while PET provides metabolic data. Radiologic criteria to define lymphadenopathy are dimensions greater than 10 mm, round morphology, presence of intranodal necrosis and extracapsular diffusion. US is more accurate than CT and MR in assessment of lymphadenopathy, because it's able to characterize micrometastatic foci and lymph node localization up to 3 mm. CT showed a sensitivity of 74% and a specificity of 100% to assess lymph nodes greater than 3 mm. Furthermore, ecocolor-Doppler US is the best technique to differentiate reactive lymph nodes, that present oval morphology and central hilum with vessels and fat; from pathologic nodes that present structural alterations, not assessable hilum, rupture of

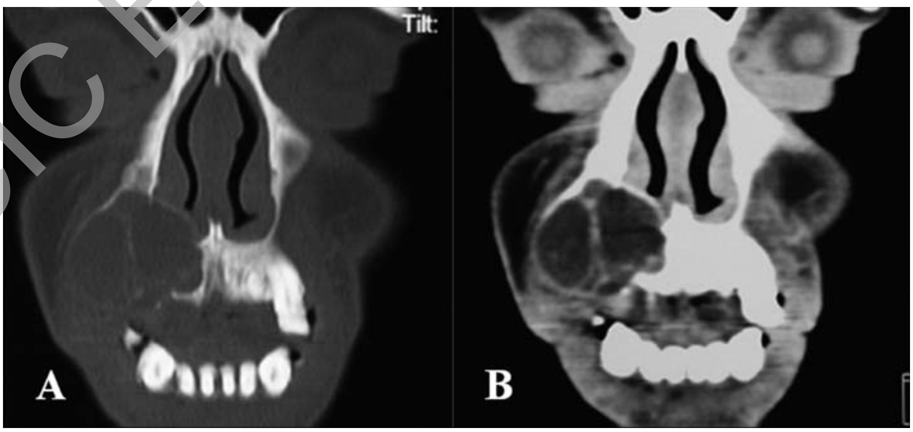

Figure 1
Bone expansive soft tissue mass of cystic appearance with irregular trabecular structures inside. CT coronal images examined with bone window (A) and soft tissue window (B) show high sensitivity in the assessment of focal bone erosion (arrow).

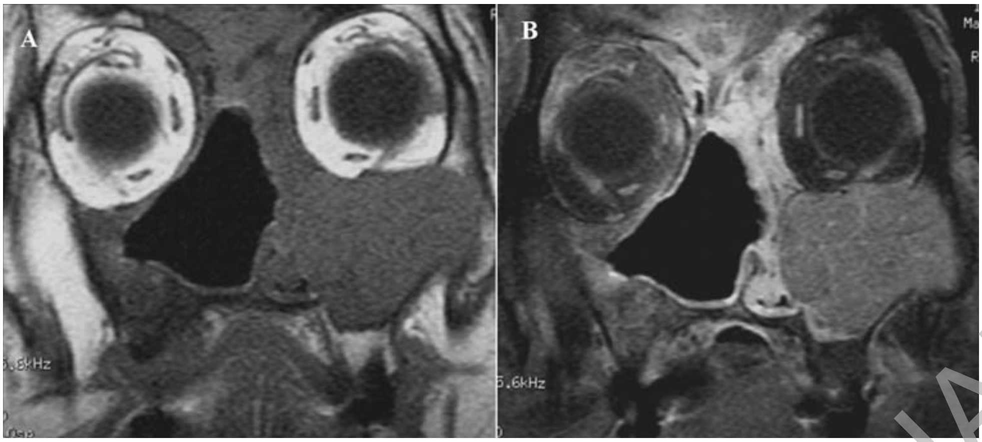

Figure 2
Coronal T1 weighted (A) and T1 fat sat weighted images after contrast medium (B). Soft tissue mass filling completely the left maxillary antrum. Mass enhances more than muscle and causes interruption of periorbital continuity: it represents the overcoming of the periosteal barrier with orbital invasion.

capsule and irregular margins (Fig. 4). The last two signs are also indicative of extra capsular diffusion that can be only evaluate with US. Necrosis is the most indicative parameter to define as pathologic lymph nodes. It's best evaluate with ecocolor-Doppler US or CT and MR after contrast medium. The transverse-to-longitudinal diameter ratio in combination with texture and margin analysis resulted in a correct diagnosis in approximately 80% of the nodes. Hilar vessels with branching indicated lymphadenitis and predominantly peripheral vessels indicated metastasis. However, in metastatic as well as benign enlarged lymph nodes, a Doppler signal is not always detectable. The use of a contrast medium for US has enhanced the signal in perfused vessels improving the differential diagnosis of inflammatory and metastatic enlarged lymph nodes (14, 15) (Fig. 5). CT-PET has a high sensitivity in identifying the primary tumor and loco regional lymph node metastases in patients with tumors of the paranasal sinuses district (16). The reported sensitivity for nodal detection using CT-PET is 80-96% with specificity of 90-94%, superior to both CT and MR for cervical nodal metastases (17), although micrometastases, which may be present in a significant number of patients, may be missed by all methods (Fig. 6).

Distant metastases and recurrence

The presence of cervical nodal disease is predictive of distant metastases. In presence of cervical lymph node metastases a chest CT should be included in the staging (18). After tumor resection the rate of recurrency depends on tumor biology and treatment planning. Furthermore, patients with paranasal sinuses tumors tend to undergo therapies that result in significant anatomical alterations, which often make it difficult to evaluate persistence or recurrence of disease by conventional imaging. CT-PET can map functional and metabolic activity before structural changes have taken place differentiating malignant from normal tissue based on enhanced glycolysis by tumor cells, but will also show increased uptake in active infection or inflammation. CT/PET can be used to stage the primary tumor including nodal involvement and distant metastases. However, the diagnostic potential of CT/PET is particularly evident in the follow-up phase, as it involves significant added value in terms of accuracy (sensitivity and specificity of 94% and 85% as against 54% and 46% of conventional imaging) (19) in differential diagnosis between recurrence and hypervascular

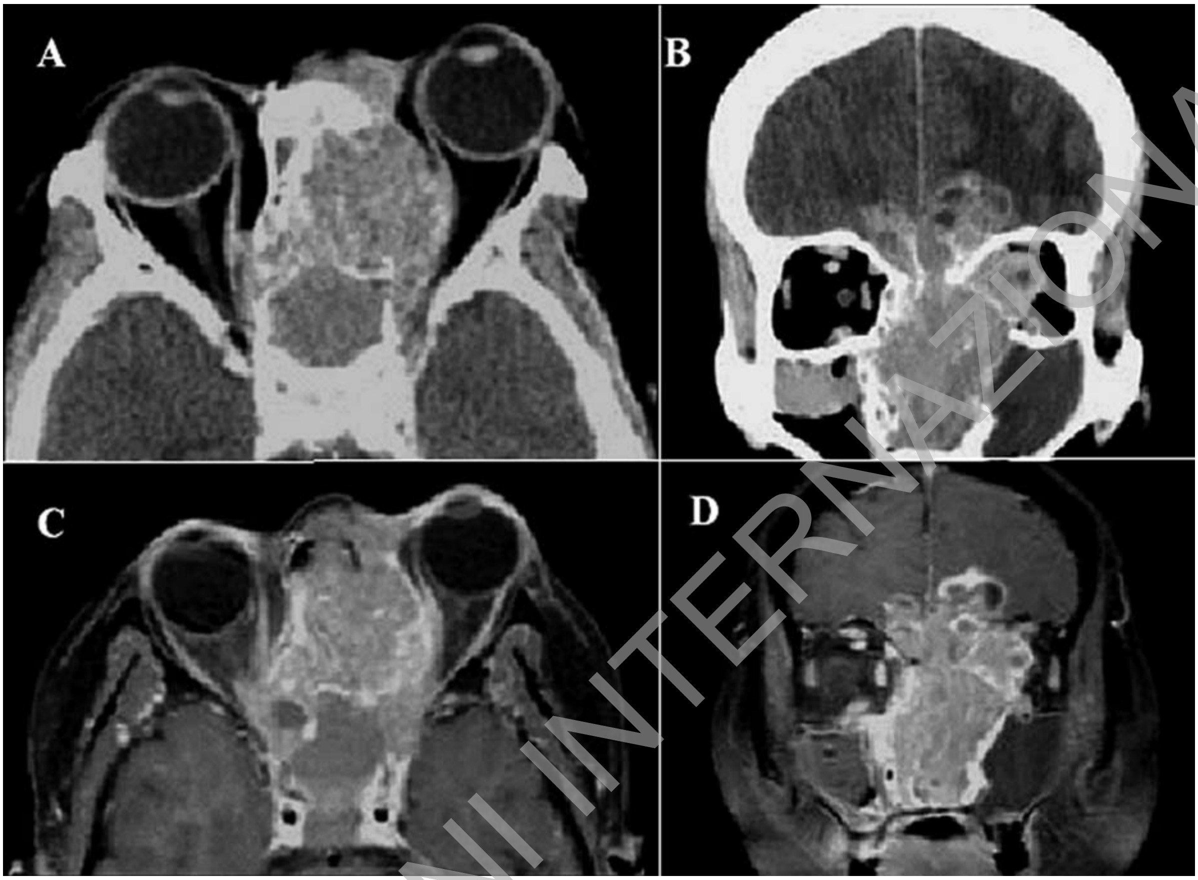

Figure 3
Neoformation in the nasal cavity with bowing of the medial wall of the maxillary antrum. CT axial (A) and coronal reformation after contrast medium (B) demonstrate bony destruction better. MRI T1 weighted after contrast medium in the same planes (C,D) better show intracranial invasion and periorbital involvement.

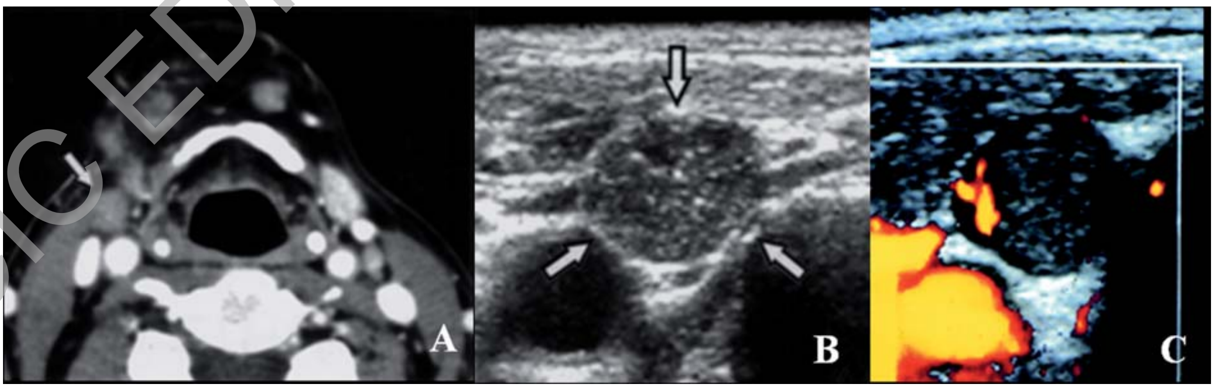

Figure 4
CT (A) Ultrasonography (B) and ecocolor-Doppler sonography (C) show a lymph node with patologic appearance: disomogeneous texture, not assessable helium and irregular margins. Moreover, it shows predominantly peripheral vessels.

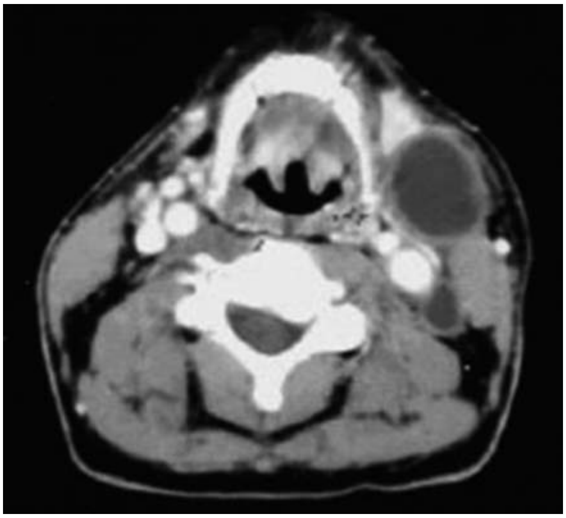

Figure 5
CT axial image post-radiotherapy in patient with paranasal sinus tumour and latero-cervical nodal involvement. The image shows a large lymph node necrosis.

fibrosis (Fig. 7). Recent studies have demonstrated that CT/PET can also be used to monitor the efficacy of medical therapy (chemotherapy), particularly as an early prognostic index of response or non-response to treatment

Conclusions

The ideal malignant paranasal sinuses tumor diagnostic test should have high sensitivity, high specificity, local staging capabilities (primary mass extension, bone involvement, soft tissue invasion and perineural spread), distant staging capabilities (assessment of lymphadenopathies and metastases), and characterization of post-treatment recurrence. No diagnostic examination meets all of these criteria.

So, the assessment of paranasal sinuses malignancies requires a multidisciplinary team approach. Advanced in diagnostic imaging have significantly contributed to the management of paranasal sinuses tumors that requires thorough assessment of location and extension in order to plan appropriate treatment (20). To provide the tumor mapping necessary for decisions regarding resectability and curability, the radiologist must know the critical areas of tumor extension that will alter a surgical or irradiation treatment plan. These areas include tumor extension into the floor of the anterior and middle cranial fossae, the pterygopalatine fossae, the orbits, and the palate.

Thus the radiologist must describe in detail the sinus and the precise areas in which the neoplasm is developed. Never treatment-planning computers are now able to utilize the raw data of the images provided by the radiologists to help prepare treatment plans. As mentioned, although the radiologist is constantly tempted to offer pathologic diagnoses, there are only rare instances in which the CT and MR imaging is specifically pathognomonic. Cross sectional imaging is rarely diagnostic, but there are features that can be used to differentiate benign from malignant disease. There-

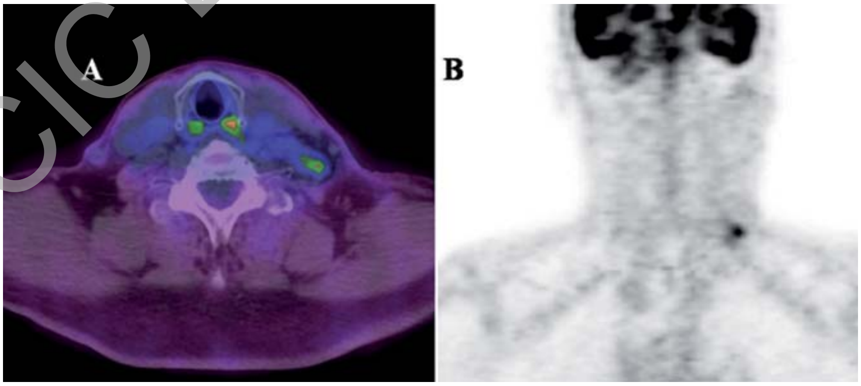

Figure 6
Fusion image CT-PET (A) and corresponding PET-FDG image (B) in staging of nodal metastases. The images show an area of intense radiopharmaceutical uptake in left latero-cervical seat confirming the presence of nodal matastasis.

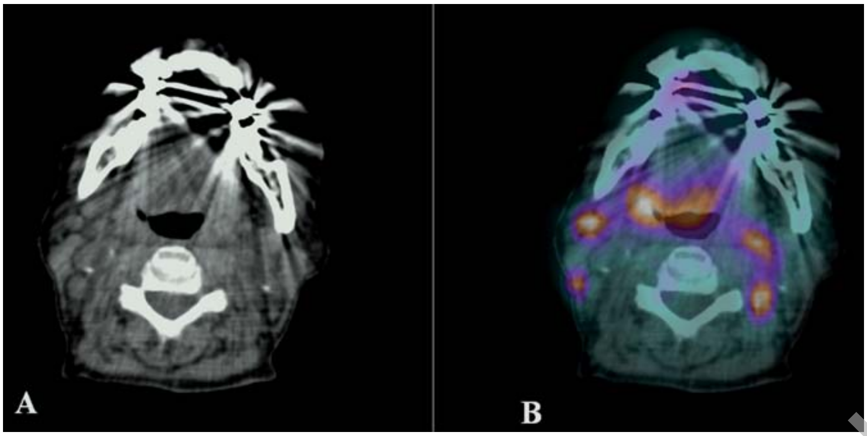

Figure 7
CT attenuation image (A) and fusion CT-PET image (B) demonstrate bilateral latero-cervical nodes with intense metabolic activity in a patient with story of sinonasal neoplasm.

fore, the primary contribution of imaging is accurate tumor mapping, with awareness of the critical anatomic sites that will influence treatment planning. Final treatment planning must await pathologic diagnosis. FDG-PET/CT can be used to stage nodal and metastatic disease and for assessing the efficacy of therapy or recurrent disease.

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INDIRECT POST-IMPLANT LESIONS OF THE INFERIOR ALVEOLAR NERVE. RADIOLOGICAL AND BIOMECHANICAL FINDINGS

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SUMMARY

Indirect post-implant lesions of the inferior alveolar nerve. Radiological and biomechanical findings

The aim of the work. The mandibular canal, if it is affected by different illnesses, often shows typical radiological changes, made up of widespread hypodensity, an increase in its diameter and disappearing walls. This study aims to verify the reliability of such radiological signs in the cases of later post-operative lesions of the mandiblular canal.

Materials and method. The study includes 16 patients, 9 males and 7 females, with an average age of 54 years, who underwent an operation to rehabilitate the mandible with a prosthetic implant for a total of 37 implants. All the subjects underwent an Orthopantograph due to the appearance of painful radicular symptoms some time after the operation.

Results. In 36 cases out of 37 we found, with the Orthopantograph, a slight increase in the calibre of the mandibular canal compared to the controlateral. In 10 subjects we observed hypodensity of the canal itself, while in 6 subjects the canal passages were no longer recognisable.

Conclusion. The radiological indications of damage of the inferior alveolar nerve (IAN) are reliable even in the case of indirect post-implant lesions.

Key words: inferior alveolar nerve, IAN, implant radiology.

RIASSUNTO

Lesioni post-implantari indirette del nervo alveolare inferiore. Aspetti radiologici e biomeccanici

Scopo del lavoro. Il canale mandibolare, se coinvolto da processi morbosi, mostra frequentemente tipiche alterazioni radiologiche, costituite da ipodensità diffusa, incremento del diametro e scomparsa delle pareti. Questo studio si propone di verificare l'attendibilità di tali segni radiologici nei casi di lesioni post-implantari a distanza del canale mandibolare.

Materiali e metodi. Lo studio comprende 16 pazienti, 9 uomini e 7 donne, età media 54 anni, sottoposti a intervento di riabilitazione implantoprotesica della mandibola per complessivi 37 impianti. Tutti i soggetti sono stati sottoposti a Ortopantomografia per la comparsa di sintomatologia dolorosa radicolare a distanza di tempo dall'intervento.

Risultati. In 36 casi su 37 si è riscontrato all'Ortopantomografia un lieve incremento del calibro del canale mandibolare rispetto al controlaterale. In 10 soggetti si è osservata ipodensità del canale stesso, mentre in 6 soggetti le pareti canalari sono risultate non più riconoscibili.

Conclusioni. In conclusione i segni radiologici di compromissione del nervo alveolare inferiore riscontrabili all'OPT risultano affidabili anche in caso di lesioni post-implantari indirette.

Parole chiave: nervo alveolare inferiore, IAN, radiologia implantologica.

Introduction

When the lower alveolar nerve is affected by any mechanical, iatrogenic, neoplastic or inflammatory process, we can clinically see the appearance of typical trigeminal symptoms, together with typical radiological changes of the mandibular canal, consisting in widespread hypodensity, increase in diameter and disappear-

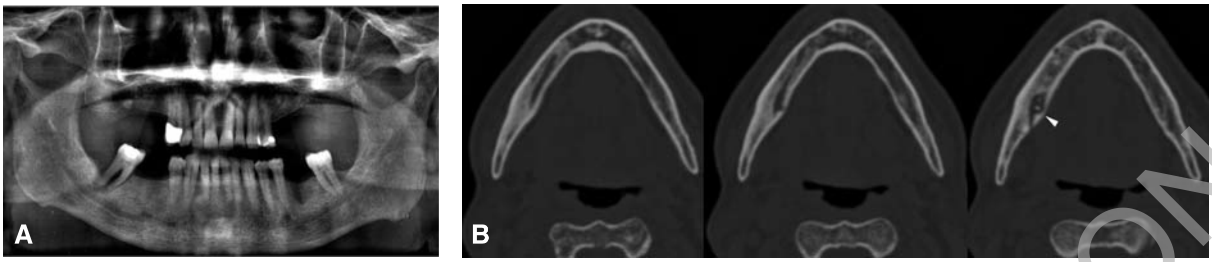

Figure 1
When the mandibular canal is affected by any illness, typical radiological changes appear which are widespread hypodensity, increase in its diameter and disappearance of the thin radio-opaque wall stria. The changes are clearly visible both from the OPT (A) and the CT scan images (B).

ance of the thin radio-opaque stria which makes up the walls (Fig. 1). The MRI and the study of trigeminal sensory evoked potentials (SEP) suggest the probable pathogenic mechanism of the clinico-radiological symptoms described, represented initially by a painful vascular-nervous band with oedema, a phase in which the symptoms appear. Subsequently, such a swelling probably exercises pressure on the bony walls of the canal, causing the appearance of typical radiological changes after about two weeks. An X ray can therefore help confirm clinical suspicions (1-5).
This study aims to check the reliability of the radiological signs in the later appearing post–implant lesions of the mandibular canal, in a group of patients with these symptoms.

Materials and methods

The study involves 16 patients, 9 males and 7 females with an average age of 54, who underwent an operation to rehabilitate the mandible with a prosthetic implant for a total of 37 implants. None of them had complained of complications in both the immediate intra or postoperative phases, since in the operations carried out the implants had neither crossed nor torn the nerve, even if they had been positioned with their tips close to the mandibular canal.
In 15 subjects the trigeminal symptoms appeared in a period of time comprising between one and ten days after restarting mastication and, in one case, after 21 months.
One or more Orthopantographs were carried out at the request of the dentist, soon after the functional loading of the prostheses, following the appearance of pain, paraesthesias on numbness in the area of the third branch of the trigeminal nerve. A CT scan with panoramic and cross reconstructions was carried out on 4 patients.
For each individual patient, clinical symptoms and x-rays were correlated to biomechanical analysis, through FEMS extrapolated of the images available, developed with the aim of evaluating implant response to immediate loading.

Results

In 36 patients out of 37 the OPT showed a slight increase in the calibre of the mandibular canal compared to the controlaterale, with values higher than 2,5 mm. In ten subjects, (60% of cases), we observed hypodensity of the canal itself, while in six cases (37%) the canal walls were no longer recognisable (Figs. 2, 3).
Biomechanical analyses confirmed what we already knew and that is that, in addition to the pericervical transmission zone, there is also a secondary stress zone which extends around the tip of the prosthesis (Fig. 4), characterised by a radius of about 1.5-2 mm and low tensional values, comprised between 0.3 and 1 MPa.

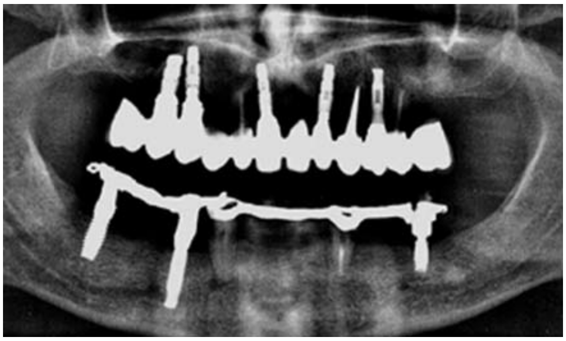

Figure 2
A 67 year old male with symptoms. The implant is positioned very close to the right chin-cap foramen. The canal appears hypodense, the bony walls are still recognisable.

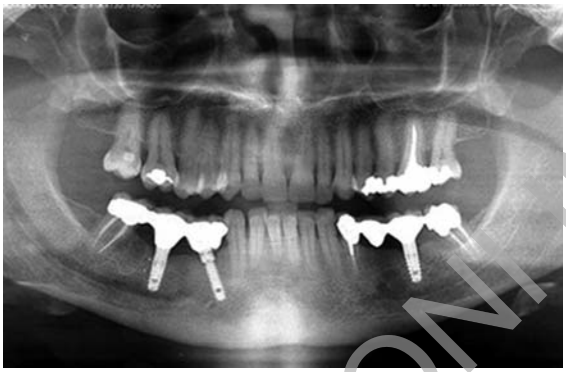

Figure 3
A 59 year old female with symptoms. In the right lower molar area, the tip of the implant is positioned near the mandibular canal, which is hypodense and slightly wider compared to the controlaterale. The walls are hardly recognisable.

The models carried out on the cases characterised by the peri-cervical resorption cone clearly show that the extension of the stress zone around the tip increases with the deepening of the cone itself, particularly when the cone goes beyond the first coil which is fixed inside the bone (Fig. 5).

Discussion

Our results indicate the generalised radiological signs indicating problems with the lower alveolar nerve are also present in the indirect post-implant lesions.
In particular, already two weeks after the functional loading of the implant, we almost always noted a widening of the mandibular canal, whose normal diameter is not bigger than 2,5 mm (1), In any case it is important to integrate the measurements with a subjective evaluation by the radiologist by comparing it to the controlateral canal.
The frequency of other symptoms found in various combinations such as canal hypodensity and disappearance of the walls is also significant (Fig. 3). In the only case in which the canal was not wider, only the disappearance of the walls was found.
Even though our study did not include the study of the reversibility of the described radiological finds, we do point out that in the 6 cases in which it was possible to carry out a check-up 6-12

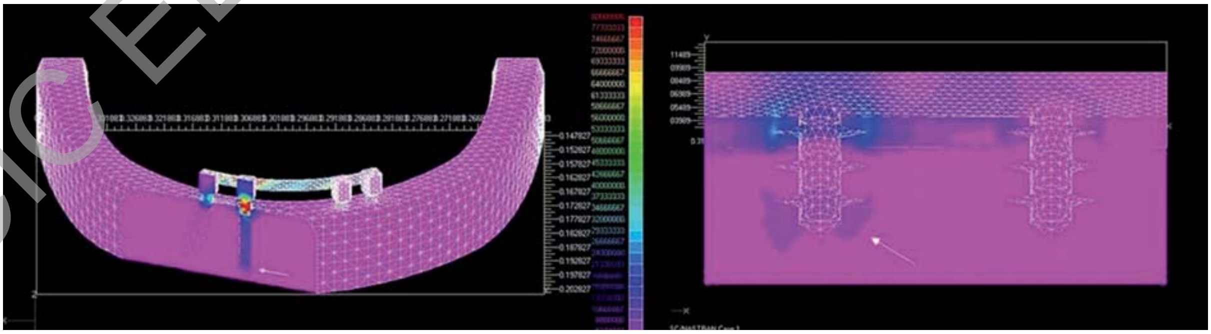

Figure 4
The biomechanical analyses show that, as well as the known area of pericervical transmission, there also exists a secondary stress area, which extends around the tip of the implant (white arrow), characterised by a radius of about 1.5 – 2 mm and low tensional values, comprised between 0.3 and 1 MPa.

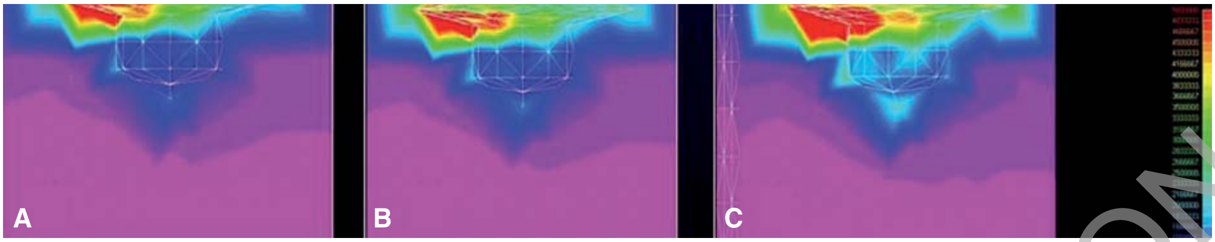

Figure 5
The FEMs show a progressive increase in the tensional values and in the extension of the stress around the tip which is proportional to the deepening of the resorption cone at the level of the implant collar. The pictures refer to the implant tip. A) Absence of pericervical resorption B) 1.5 mm resorption C) 2.5 mm resorption.

months after the disappearance of the symptoms, the radiological signs were still evident.

The secondary stress zone, which extends around the tip of the implant, effectively presents states of tension which are insufficient to cause direct lesions on the bony walls of the canal, but it is able to irritate the nerve with time and to subsequently cause, indirectly, the radiological changes that follow the symptom after a few days. The above can occur particularly if the tip is located less than 1.5 mm from the lower canal which distance corresponds to the average radius of the secondary transmission area and which could therefore be considered a safety distance.

Moreover, it is important to underline that the models carried out on cases having a pericervical resorption cone show that **the extension of the stress zone around the tip increases with the deepening of the cone itself** (Fig. 5), particularly when the cone goes beyond the first coil which is fixed inside the bone, a phenomenon that is already known (1, 6, 7). This detail probably explains one of our cases, in which the symptoms and the radiological changes only appeared after 21 months, at the same time as the deepening of the resorption cone (Fig. 6).

In conclusion, the Orthopantograph evidence of damage to the mandibular canal are also reliable in the cases of later appearing post implant lesions and are well correlated to the clinical symptom. Their appearance can be an important tool for the implantologist because they help to confirm the clinical suspicion that the lower alveolar nerve is indirectly involved.

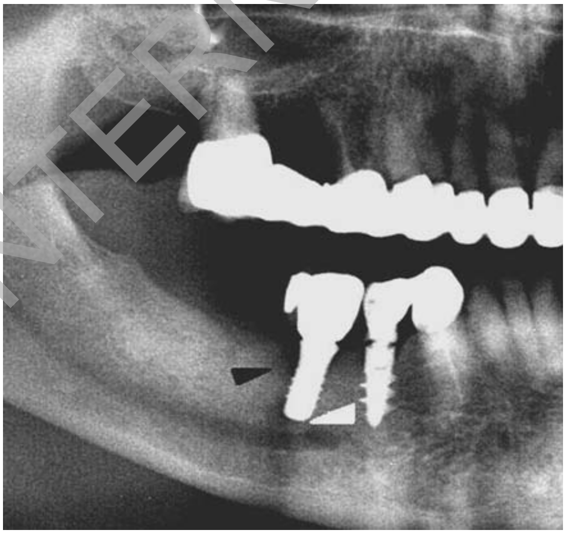

Figure 6
49 year old male. The orthopanoramic X Ray, carried out 21 months after the operation due to trigeminal pain, shows some pericervical resorption (dark arrow) and, at the same time, typical changes of the mandibular canal (white arrow). The same examination, carried out 18 months earlier did not show any lesions, either at the collar level or at the tip.

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IMMEDIATE-LOADING POST EXTRACTIVE IMPLANTS: INDICATIONS, ADVANTAGES AND LIMITS

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SUMMARY

Immediate-loading post extractive implants: indications, advantages and limits

The possibility of rehabilitating immediately an edentulous patient offers today remarkable advantages because it satisfies the patient's demands for comfort, aesthetics, and functionality and reduces the surgical stages for the professional.
In the last years clinicians and companies have been concentrating their efforts in the development of new surgical techniques and biomaterials in order to speed up the osteointegration process, which fosters the functionality, that is the immediate-loading.
This clinical report, based on the analysis of the literature and on the presentation of a case report, shows how satisfying results in functionality and aesthetic can be obtained by a careful diagnosis and an accurate therapeutic planning, reducing at the same time the stress for the patient and the surgical stages for the professional.
In any case, it is necessary to have the rehabilitations with immediate-loaded implants directed by workers with a good knowledge and experience in surgery, periodontology, and prosthesis or by a work team able to face all the complications such advanced rehabilitations may cause.

Key words: implants post-extraction, immediate implants.

RIASSUNTO

Gli impianti post-estrattivi a carico immediato: indicazioni, vantaggi e limiti

La possibilità della riabilitazione immediata nel paziente edentulo rappresenta oggi un notevole vantaggio in quanto risponde pienamente alle esigenze di comfort, estetica e funzionalità del paziente stesso e riduce notevolmente i passaggi operativi per il professionista.
Negli ultimi anni la ricerca dei clinici e delle aziende si è focalizzata sullo sviluppo di tecniche chirurgiche e biomateriali capaci di accelerare il processo di osteointegrazione a vantaggio della funzionalità cioé del carico immediato degli impianti.
Il nostro lavoro, basato sull'analisi della letteratura e sulla presentazione di un case report, evidenzia come con un'attenta diagnosi e con una corretta programmazione terapeutica sia possibile ottenere dei risultati favorevoli in termini di funzionalità e di estetica, limitando lo stress per il paziente ed i passaggi operativi per l'odontoiatra.
È necessario, comunque, che la gestione delle riabilitazioni con impianti a carico immediato sia affidata ad operatori con buone conoscenze ed esperienza in chirurgia, parodontologia ed in protesi o comunque ad una equipe odontoiatrica polispecialistica in grado di affrontare le diverse complicanze che riabilitazioni così sofisticate possono presentare.

Parole chiave: impianti post-estrattivi, impianti a carico immediato.

Introduction

Thanks to the recent progresses in the biomaterials and in the surgery technique, the dentist has effective instruments available to realize complex treatment plans. In particular, the original operative osseointegration protocols have been redefined in order to satisfy the patient's increasing expectations both as regards the reduction of the treatment period and the improvement of the aesthetic and post-operation comfort.

Figure 1
Vestibular fistula near the dental unit 2.1, which had been devitalized and restored by a Richmond crown.

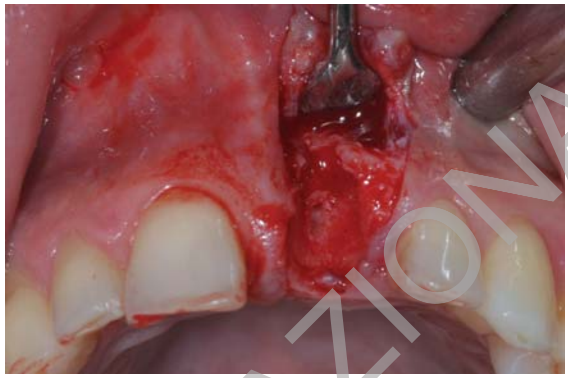

Figure 3
A mini flap is opened in the vestibular area of the dental element 2.1 to see the bone defect and to make it accessible.

Figure 2
Irremediably compromised abutment on the 2.1.

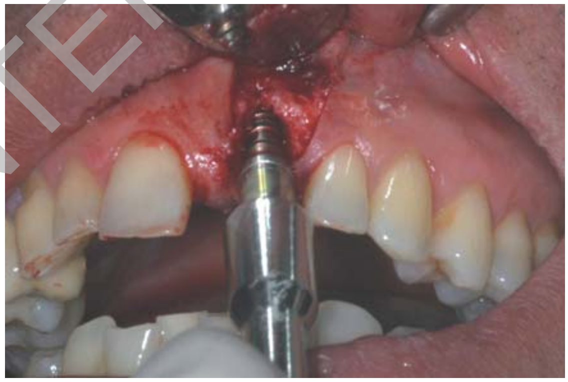

Figure 4
BTLock expander-compactors were used to prepare the implant site without bone loss.

The introduction of the new systems with immediate and delayed loading have permitted to decrease the time of the therapy. The classical pattern "no load on the implant during the healing" has became "no micro movements on the implant during the healing".
In the aesthetic field the preservation of both soft and hard tissues (especially in visible areas) has been underlined. As consequence, to avoid the bone resorption after the dental extraction, the concept of post extractive implantology has developed.
It is common that, especially on the upper jaw, about the 23% of the bone volume disappears during the 6 months after the extraction, and an other 11% of it disappears during the 2 following years (13). The possibility of inserting the implant directly on the extractive alveolus permits to decrease this resorption alveolar and to reduce the period of healing. Moreover, the use of a flapless technical guarantees the minimal resorption of the gingival tissues and a better aesthetic result.
Many studies have showed the validity of the immediate-loading in the post extractive implants and have guarantee the security of the operative process as long as the stiff fixed protocols are respected (1-3).
The good primary stability after the insertion of the implant and the respect of the concept of

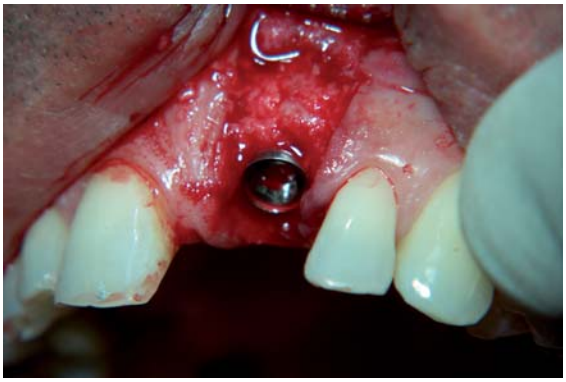

Figure 5
Implant inserted. The vestibular defect is solved by autologous bone.

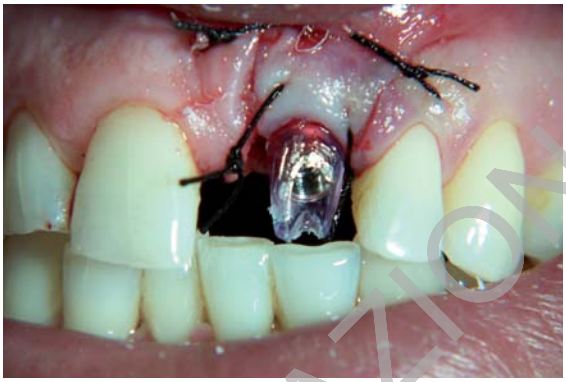

Figure 7
Plexiglass abutment ready for the cementation of the provisory crown.

Figure 6
At the end of the surgical stage a temporary castable abutment made of plexyglass is placed on the implant top.

Figure 8
At the end of the surgical stage the provisory is cemented.

"jumping distance" developed by Knox (4,5) are very important to the aims of the osseointegration and of the possibility of immediate-loading of a post extractive implant. "Jumping distance" means the distance between the implant surface and the surrounding alveolar walls: if such gap is upper than 0,5 mm, you can not forecast the bone deposit on the surface of the implant without the use of membrane and regenerative procedures.
During the treatment of the aesthetic areas, such as the frontal jam region, even if there is the way of the alveolus, it is important that the preparation of the implant site is made to the detriment of palatal wall to preserve the most possible the vestibular side, very important for aesthetic aims. To reach the primary stability it is very important to choose carefully the shape and the dimension of the implant.
Recently the literature has introduced some studies which evaluated the dimensional variations of the soft tissues and the gingival recessions often associated with the second surgery phase, that means to the exposition of the fixture and of the placement of the abutment. In these works the Authors described the possibility of disadvantageous morphological variations in the aesthetic areas, especially in the subjects with thin biotype (6-10). These results underline even more the importance of the post-extractive implant, in order to, if it is possible, save the aesthetic of the gingival tissues.

Firstly, the stiff operative protocols fixed for the post-extractive implants did not included the tooth that presented clinical and radiographical signs of infections (11). Actually some researchers have begun to insert implants also during such disadvantageous conditions, except for a light curettage and of a wash with antibiotical solutions of the post-extractive alveolus. The results have not showed any difference during the healing of these implants respect to the ones realized after the extraction of the elements not characterized by infections (12, 14, 15).
Moreover, you have to take into account the great approval that such therapeutical approach has in patients since it reduces the treatment period, halves the surgical stages, and let an immediate prosthetic rehabilitation with huge aesthetic and functional advantages (18-20).

Case report

A non-smoking adult patient with a negative anamnesis came to our clinic with a vestibular fistula near the dental unit 2.1, which had been devitalized and restored by a Richmond crown. After removing the crown and verifying that the underlying abutment was carious and did not allow a further rehabilitation, we decided to extract it and to place an immediate-loading and post-extractive implant.

The extraction was made atraumatically and observing the protocol provided for the immediate-loading. The dislocation was made by a straight tooth-root elevator and the extraction was made by a forceps. To prevent the spread of the infection, a careful and delicate curettage of the alveolus was performed. During this cleaning a bone defect along the vestibular wall of the alveolus was observed. For this reason, instead of a flapless surgery, a little flap was opened to see the bone defect and to make it accessible. According to the surgical protocol, the preparation of the implant site was made to a larger damage of the alveolar palatal wall preserving the vestibular side. The pilot drill was used to make the first drilling on the alveolar palatal wall and then the BTLock expander-compactors were used, from 1,8 mm till 4,5 mm in diameter, to place an implant 11,5 mm long and 4,5 mm in diameter. We paid particular attention in placing the implant platform at 3 mm apically from the vestibular margin of the free gum.
BTLock expanders-compactors have been chosen because of the several advantages they offer: they compact the site wall, increase the implant primary stability especially in case of porous bone, such as the superior maxillary. Furthermore they are manual instruments, so they allow a slow penetration in the bone, which assures a better directional control than the rotating tool.
The implant we chose was about 3mm longer than the extractive alveolus and it was placed in a more

Figure 9
Healing of the gingival tissues at the removal of the sutures after 8 days.

Figure 10
After 3 months the provisory is removed.

Figure 11
Transfer inserted to realize the definitive impression.

Figure 12
Definitive abutment made in laboratory.

Figure 13
Cementation of the definitive crown.

palatal position than the natural teeth in order to obtain a better primary stability, which is a prerequisite condition for immediate-loading. The vestibular defect is solved by autologue bone, the flap was carefully closed in order to cover the whole defect but without any membrane.
At the end of the surgical stage a temporary castable abutment made of plexyglass was placed on the implant top. The abutment was prepared in laboratory to receive the provisory crown in resin, which had been realized before. The adjustment and finishing phase of the provisory on the implant has a strategic role for the final result in this kind of technique. The accuracy of the adjustment has to be great in order to condition the healing of the soft tissues and to achieve optimal aesthetical results (7, 8, 11, 12).
The provisory was checked from the functional point of view: it does not have to come into contact neither with the antagonistic teeth (neither in usual nor in eccentric occlusion) nor with the adjacent ones in order to prevent damaging micromovements for the osseointegration. At the end of the finishing and cementing of the provisory, according to the protocol, some general warnings were given to the patient: he should avoid parafunctions and masticatory loadings on the provisory and follow oral hygiene instructions at home in order to foster an optimal healing of the tissues.
Antibiotics for 6 days and non-stereoidal anti-inflammatories were prescribed. The sutures were removed after 8 days and the patient was visited every 10 days. The abutments was left undisturbed till the end of the 3rd month.
Now the implant stability is tested. As long as all the conditions are satisfied, the definitive impression in polyvinyl-siloxane by pick-up technique and screwed transfer is taken.
In the laboratory, a master model in extra-hard plaster is reproduced, on which a single abutment is realized by castable abutments. On the single one a gold cap is realized. Position and thickness of the abutment and of the whole structure is tested in the patient's mouth. A position impression in polyvinyl-siloxane is now taken to let the laboratory a better ceramization of the whole structure. Finally the abutment is fixed by a torque of 35 Ncm and the definitive crown is cemented.

Figure 14
Control at 3 months.

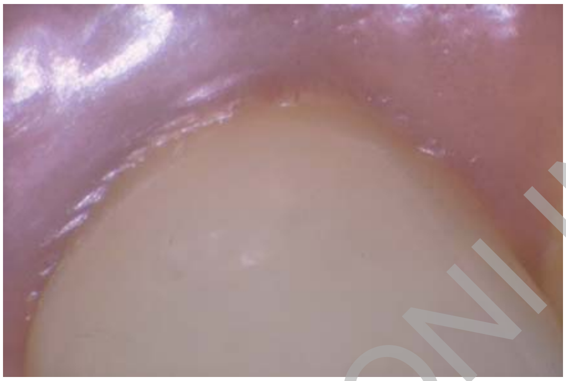

Figure 15
Control at 3 months: by a greater magnification you can notice the perfect healing of the periodontal tissues.

Conclusions

Recent works appeared in literature and our clinical experience let us declare that post-extractive implants are today a reliable alternative in the traditional implantology. However, to reach satisfactory results is necessary to select carefully the clinical case and to follow strictly the surgical and the prosthetic protocols. The greater difficulties compared with the conventional procedure require a well-trained team able to control the surgical and the prosthetic problems, that the immediate-loading post-extractive implants determines.

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ORAL & IMPLANTOLOGY

case report

SURGICAL EXTRACTION OF LOWER THIRD MOLARS: DIAGNOSTIC TESTS AND OPERATIVE TECHNIQUE IN THE PREVENTION OF INFERIOR ALVEOLAR NERVE INJURY. CASE STUDY

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SUMMARY

Surgical extraction of lower third molars: diagnostic tests and operative technique in the prevention of inferior alveolar nerve injury. Case study

Increased knowledge and technical refinement have broadened the limits of outpatient oral surgery; however, these changes have at the same time led to a greater number of complications and poor outcomes and, accordingly, to legal action for professional responsibility. Oral surgery represents 10% of all actions, and almost all of these are attributable to exodontic surgery, of which around a third are related to inferior alveolar nerve injury following the extraction of lower third molars.

The aim of this case study is to suggest operative technical strategies in accordance with a correct clinical-diagnostic pathway in order to prevent neurological complications involving the inferior alveolar nerve subsequent to lower third molar extraction. Cases should be carefully selected and surgical intervention undertaken solely when genuinely necessary. The patient should be informed of the risks, the methods and the possible results of the treatment. These are the bases for correct indication, along with a sufficient diagnostic path and a good level of communication between operator and patient.

Key words: trigeminal nerve injury, computerized tomography, third molar extraction.

RIASSUNTO

Chirurgia estrattiva dei terzi molari inferiori: accorgimenti diagnostici e di tecnica operatoria nella prevenzione delle lesioni del nervo alveolare inferiore. Casistica

L'aumento delle conoscenze e l'affinamento delle tecniche se da un lato ha ampliato quelli che sono i limiti della chirurgia orale ambulatoriale, contestualmente ha condotto ad un aumentato numero di complicanze e insuccessi e, in modo speculare, di contenziosi per responsabilità professionale. La chirurgia orale rappresenta il 10% di tutti i contenziosi e la quasi totalità di questi eventi è imputabile alla chirurgia exodontica, di cui circa un terzo è costituita da lesioni del nervo alveolare inferiore a seguito di estrazione di denti del giudizio inferiori.

Scopo della presente casistica è quello di suggerire accorgimenti di tecnica operatoria in funzione di un corretto iter clinico-diagnostico al fine di prevenire complicanze neurologiche del nervo alveolare inferiore in occasione di interventi avulsivi di ottavi inferiori. Sarebbe opportuno selezionare accuratamente i casi e intervenire chirurgicamente solo quando vi è una reale necessità. Il paziente deve essere informato dei rischi, delle modalità e delle possibilità di risultato del trattamento. Queste sono premesse fondamentali per un'indicazione corretta, insieme, ovviamente, a un sufficiente percorso diagnostico e a un buon livello di comunicazione tra operatore e paziente.

Parole chiave: lesione del nervo trigemino, tomografia computerizzata, estrazione dei terzi molari.

Introduction

Inferior alveolar nerve damage is a rare but serious complication associated with a number of dental procedures. Oral surgery represents 10% of all actions, and almost all of these are attributable to exodontic surgery, of which around a third are related to inferior alveolar nerve injury following the extraction of lower third molars. This injury occurs with equal frequency in implantology, and more rarely following endodontic (orthograde and retrograde) procedures or nerve block anaesthesia (1).

Lower third molar extraction is one of the most frequently performed procedures in odontostomatological and maxillo-facial surgery. Lack of space in the retromolar region is the most common cause of retention/impaction of the lower wisdom teeth; around 84% of individuals aged twenty present with retained lower third molars (2).

The frequency with which third molar extraction is performed leads inevitably to an increased risk of damage to nerve structures, in particular the lower alveolar nerve. The operation may prove particularly subject to investigation, even in the most expert hands, due to the anatomical position, the difficulty of visual and tool access, morphological variability of the impaction and the equally variable relationships with adjacent structures (3).

The indications for impacted third molar extraction seem obvious in the presence of pathologies, such as recurrent pericoronitis, caries of the lower second and third molars, parodontitis of the third and/or the second molar, radicular reabsorption of the settimo, chronic facial pain not due to any other cause, or other associated pathologies (cysts, tumours, supernumerary teeth, etc.). There may also be indications of an orthodontic or prosthetic nature, but the fact remains that most lower third molars, impacted or otherwise, remain asymptomatic for the entire life. This therefore raises the problem of preventative extraction, in the absence of associated pathologies or symptomology, especially where there is a risk of iatrogenic inferior alveolar nerve injury (3-5).

Surgical anatomy

The inferior alveolar nerve crosses the entire length of the mandibular canal and, in the premolar region, divides into its two terminal branches, the mental nerve and the incisive nerve. Its intramandibular course runs obliquely in a cervicocaudal and medio-lateral direction. The position of the lower teeth, especially the third molar, in relation to the mandibular canal and its contents is of particular importance. The relationship of the root tips to the canal may take the form of contiguity, with a bony septum separating root and canal, or of continuity where the periodontium of the lower third molar is in direct contact with its content: this condition may explain the pain of a neuralgic type which often arises following the extraction of the tooth or during inflammation of the periodontal ligament (6, 7).

From a spatial point of view, four different arrangements may be identified (6).

The most frequent situation is that in which the base of the alveolus of the third molar is in contact with the roof of the canal: a fine lamellar diaphragm may separate the two compartments, or the periapical connective tissue of the lower third molar is in direct contact with the contents of the canal.

In a large number of cases there is no spatial relationship between these structures: this occurs when the mandibular body is relatively high and the dental roots are of average length.

A third situation involves a closer and more complex relationship: in standard x-rays the roots are shown to extend beyond the level of the mandibular canal, although it is quite rare for them to meet. In this case the lower third molar may be lingually inclined and its roots exceed the canal on the buccal incline; vice versa, the opposite situation is found.

In rare cases root complex is positioned in part on the vestibular side and in part lingually, thus becoming intimately connected with the contents of the canal. When the root tips of the two sides are fused, the vascular-nervous bundle crosses a channel within the root complex. There are therefore evident complications involved in extraction in the presence of this anomaly.

Eziopathogenesis and physiopathology of nerve damage

The pathogenic mechanisms at the basis of nerve damage during the extraction of the lower third molar may be broadly divided into two categories:
– mechanical: compression, strain, trauma, laceration, partial or total section of the nerve branch by rotating instruments, levers, pliers, endo-alveolar *curettage* devices, etc.;
– thermal: due to the use of high-speed rotating instruments without cooling.
The consequent anatomical and functional injuries are described in Seddon's classification which, on the basis of the extent of the anatomical damage, recovery time and prognosis, recognises three categories of nervous damage: neuropraxia, axonotmesis and neurotemesis. This distinction proves extremely useful for the diagnosis of nerve damage, and for gauging the possibility of functional recovery and the need or timing of possible microsurgical treatment (8-10).
Neuropraxia consists of a temporary block in nervous conduction without anatomical damage mostly following mechanical trauma of a mild nature, such as compression or prolonged traction of the nerve branch. Usually the sensory disturbance disappears within around four weeks and there is no need to intervene to repair the injured structure (8-10).
Axonotmesis is a more serious form of nerve damage caused by excessive traction or compression of the nerve. From the anatomo-pathological point of view, edema, ischemia and demyelination may be present; the continuity of the nerve structure is maintained but some axonal continuity may be interrupted. Patients report reduced sensitivity in the affected area – hypoesthesia – often accompanied by paraesthesia or dysesthesia; slow recovery of sensitivity begins around 5 to 11 weeks after the initial nerve damage and continues for the following 10 to 12 months. Microsurgical intervention is not generally necessary, except in cases of persistent neuropathic pain (8-10).
Neurotmesis is the most severe form of nerve injury and consists of a complete interruption of the nervous structure, affecting both the axon and the myelin sheath. In order for sensitivity to be recovered, often only very partially, timely microsurgical intervention is needed to bring together the sectioned nerve ends. The prognosis depends largely on the rapidity of intervention, the extent of the damage and the location of the nerve structure, whether intraosseous or in the soft tissues (8-10).

Diagnostic tools

Where there is a clear risk of biological damage, the planning of a third molar extraction in close spatial relations with the inferior alveolar nerve requires an accurate medical history, a precise clinical examination and, principally, a timely radiological examation. Furthermore, prior to any medical treatment, the patient must be correctly informed and valid consent obtained.
In dentistry, two traditional forms of radiographical examination are routinely used: endo-oral x-ray and orthopantomography. The endo-oral x-ray is the most commonly used tool, as it is easy to use and provides good definition. However, it is subject to three main limitations: the image may be partially distorted, especially if badly positioned; it enables the examination of a limited area only; and is difficult to carry out in the region of the lower third molar as the positioning of the film is poorly tolerated by patients. Orthopantomography, on the other hand, enables information regarding both dental arches to be displayed on a single x-ray, and is fast and simple to carry out, but does not provide a solution to the problems of distortion, which may be from 25% to 30%. Furthermore the principal limitation of both radiographical techniques is that they render two-dimensional images and do not provide in-

formation on the depth of the structures under examination. They do not permit an examination of the relative positioning of the roots of the lower third molar and the mandibular canal from the buccolingual side, other than by means of the "tube shift" technique using endo-oral x-rays, and in any case they do not provide information on possible anomalies relating to the number and shape of the roots (for instance, apical hooks) (11-13).

The most precise images and multi-dimensional information may be obtained using CT and the appropriate software, such as Dentascan. In relation to anatomo-morphological studies of this type, this examination makes a decisive contribution to surgical risk assessment and to the planning and choice of the most appropriate extraction techniques to be employed. Unlike two-dimensional endo-oral x-rays and orthopantomography, the multi-plane transversal mandibular sections that may be obtained secondarily (panorex and paraxial or cross-section), without volume artefacts and with a ratio of 1:1, show the correct and and exact spatial positioning of the anatomical structures under examination. However, the standardized use of CT involves significantly higher costs both in economic and biological terms compared with traditional radiographical diagnostic examinations and is therefore to be performed only when judged necessary (11-13).

Finally, when prescribing the examination the surgeon must indicate the width of the interspaces between the paraxial and parorex sections, which should not be greater than 1 mm. Otherwise anatomical risk factors, such as apical hooks close to the canal, may be off-section and therefore missed by the operator.

Materials, methods and results

The case study illustrated takes into consideration all the extractions of lower third molars in which conventional x-ray examinations (orthopanoramic and endo-oral periapical) showed that the root structures overlapped with or had a relationship of continuity with the mandibular canal. Some patients were presented for observation by other colleagues; others autonomously chose our structure. A CT dentascan of the lower dental arch was prescribed for all patients to obtain a more detailed three-dimensional view of the root morphology and the position of the teeth in relation to the inferior alveolar nerve. All the procedures were carried out in the Department of Clinical Odontostomatology at the Institute of Clinical Dentistry at the University of Rome "Sapienza" from 2005 to 2007.

A total of 50 surgical extractions were carried out, involving 29 patients, of whom 13 were male and 16 female, aged between 20 and 64 years and with an average age of 31.9 years.

In all cases extraction was clearly indicated, inasmuch as current pathologies were present: 35 elements (70%) were the cause of recurrent episodes of pericoronitis, 7 (14%) were affected by invasive caries disease, 5 (10%) were the cause of periodontal problems affecting the second molar, 2 teeth (4%) had induced distal caries of the second molar, and finally, one element (2%) was associated with a complex odontomatosis damage.

58% (n = 29) of the lower third molars extracted were in a condition of osteomucous impaction; 22% (n = 11) in osteomucous semi-impaction; 10% in bone impaction; 6% (n = 3) in mucous semi-impaction and 2% (n = 1) in mucous impaction. Of these, 68% (n = 34) were mesially tilted, 14% (n = 7) were distally tilted, 10% were positioned vertically and 8% (n = 4) were horizontal.

The post-extraction findings confirmed the number of roots illustrated by the CT dentascan: 32 elements (64%) had fused roots, 16 (32%) had 2 roots, just one element (2%) had 3 roots and another (2%) 5 roots. 10 teeth (20%) had apical hooks.

A careful examination of the pre-operative CT dentascans enabled an assessment of the root structure in relation to the mandibular canal from the vestibular-lingual side: 46% (n = 23) had roots tilted lingually in relation to the canal; 28% (n = 14) rested on the roof; 12% (n = 6) were in

a vestibular position; 8% (n = 4) had non-fused cross roots below the canal; 4% (n = 2) had roots positioned in part lingually, and partially on the roof; 2% (n = 1) were positioned in part in a vestibular direction and partially on the roof.
All the extractions were performed surgically and carried out under local-regional anaesthetic, using surgical protocol and standardized equipment.
The surgical technique involved the opening of a mucoperiosteal flap using a intrasulcular bayonet incision, starting from the retromolar region and flanking the crown of the second molar in a distal-vestibular direction, and finishing with a vestibular exit in the mesial direction of the fornix. After retracting the tissue on the vestibular incline, the mucous membrane on the lingual side was carefully detached using the bevelled edge of a periosteal elevator. This latter was used on this incline for the protection of the tissues and the lingual nerve during the phases of osteotomy and odontotomy. To perform the osseous breach, carried out in all cases but one (2%), a rose cut bur or straight fissure/crosscut bur was used with abundant irrigation, to save lingual bone and periodontal tissue of the second molar.
The odontotomy, carried out in the presence of undercut placement and divaricated roots, was performed using a turbine mounted tungsten carbide rose cut bur. This operation was unnecessary in only 12% (n = 6) of cases, while in 62% (n = 32) a simple odontotomy was required and in 26% (n = 13), a multiple odontotomy.
Patients underwent antibiotic treatment beginning the day before the procedure and for five days thereafter; anti-inflammatory treatment for three days; cortisone treatment for three days administered orally in graduated doses, apart from the first dose of 4 mg of desametasone administered via intramuscular route.
Out of this select sample of extractions at risk of nerve damage, post-operative changes in sensitivity were present following only 3 procedures (6% of all extractions performed): in two of these, the clinical picture was resolved spontaneously within around four weeks and probably consisted of a form of neuropraxy; one patient, however, reported a prolonged sensation of a paresthesic and hypoesthesic nature affecting half of one lip, which lasted for around ten months.

Discussion

The data regarding the 50 procedures carried out show how important it is to obtain a preoperative diagnosis using traditional x-ray examinations alongside more sophisticated techniques which are in any case now widely available. CT dentascan examinations enable an excellent assessment of the position of the root structure in relation to the mandibular canal, and hence the adoption of techniques and extractive manoeuvres which preserve the integrity of the nerve structure.
This study takes into consideration only those cases in which the extraction of the affected elements was clearly indicated due to the presence of disease or symptoms. However, the extraction of lower third molars for purely prophylactic purposes is extremely controversial, especially when there is a serious risk of nerve damage, as in the sample under consideration here.
A number of references attest to the level of uncertainty on this issue. In 1997 the ADA provided this rather ambiguous indication: "after consideration of the individual circumstances, the dentist must decide whether to treat or monitor the impacted/unerupted tooth". In 1998 the American Academy of Paediatric Dentistry decreed that "third molars, judged to be potential or actual problems, should be considered for specialist treatment". In the same year, the American Academy of Oral and Maxillo-Facial Surgery declared categorically that "all impacted teeth are pathological and surgery is the treatment of choice". In 1999 the NICE (National Institute for Clinical Excellence) in the United Kingdom stated that there was a lack of scientific evidence to support the preventive extraction of impacted third molars unaffected by pathological conditions. In the absence of such conditions the treatment program for third molars should be standard. The build-up of plaque constitutes a risk factor but alone does not justify resorting to surgery; a first episode of

pericoronitis, if not particularly serious, should not be considered a surgical indication although second and subsequent episodes would fall into this category (15).
This study does not aim to indicate which is the best approach to the problem, but rather proposes a more rational assessment of the risk-benefit ratio. In the sample presented, the benefits derived from extraction were decidedly superior than the risk of neurological complications.
The relevant protocol indicates the opening of a intrasulcular bayonet flap incision, enabling the affected area to be widely exposed, thus facilitating excellent visual and instrumental access; however this has the disadvantage of greater edemigenous reaction in the postoperative phase.
An osseous breach was performed in almost all the dental elements involved, enabling broad luxative movements and the elevation of the roots from the nerve structure. Odontotomy was necessary in the great majority of cases, due not only to undercut placements but also to reduce the number of luxative manoeuvres and the consequent use of compressive force or stretching. There were multiple cuts in the dental element, especially in the cases involving deep impaction (total osseous and total osteomucous), least favourable positioning (horizontal, mesially tilted, distally tilted) and the most anomalous morphology (more than one root, divaricated roots, cross roots, apical hooks). Sections were not carried out in full, so as not to bring the rotating tool too close to the nerve structure thus avoiding accidental cuts or overheating; the residual dental septum was then fractured using back and forth luxative movements of the dental fragments obtained.
The suitable luxative manoeuvres were chosen on the basis of the vestibular-lingual positioning of the roots indicated by the CT dentascan: luxation of the crown in a vestibular direction and a evelating motion in the case of lingually positioned root structure; vice versa in the case of vestibularly positioned roots.
If the third molar rests on the roof of the canal, a elevating motion is to be used to distance it from the latter, with the aid of a sufficient breach in the bone and an adequate odontotomy in the case of horizontal, mesially-tilted and distally-tilted elements (7, 14).
Particular care is to be taken in the presence of apical hooks: the elevation of the dental element without a preventive movement away from the radicular curve of the canal may lead to traction and stretching of the nerve and even to the tearing and partial or total section of the latter.
Roots positioned in part vestibularly and in part lingually in the canal render the situation more complex: in these cases, the odontotomic cut is incomplete and is concluded with the fracture of the residual dental septum, and must lead to the separation and independent avulsion of the individual roots.
Fortunately there were no cases present in this study of tunnel roots, or rather cross roots with fused apices below the canal: in this case, it is advisable to induce the fracture and separation of the dental bridge positioned between the apices using delicate luxative manoeuvres to divaricate the roots (7, 14).
In spite of all the cautionary provisions undertaken throughout the procedures, three cases of nerve damage arose in the most surgically complex situations: there was one case of probable axonotmesis, which was resolved within approximately one year, following the extraction of a mesially-tilted 3.8 presenting in osteomucous semi-impaction with five cross roots (three lingual and two vestibular) with a lingually tilted hook on the mesio-vestibular root (Figs. 1, 2 and 3); two cases of neuropraxy, which disappeared after four weeks, following the extraction of a 4.8, presenting in deep osseous impaction and horizontally positioned on the roof of the canal (Figs. 4, 5 and 6), and of a 3.8 presenting in osteomucous semi-impaction, distally angled, vestibularly positioned fused roots and a significant apical hook curved around the floor of the mandibular canal (Figs. 7, 8 and 9). In the first case, the luxative force of the compression used to extract all three roots and possible stretching with an injury caused by the hook most probably led to the disruption of the axon fibre; in the second case, compression forces due to the luxative manoeuvres used, along with a post-operative oedema, probably gave rise to a temporary disruption of

Figure 1
Case 1: pre-operative ortopanoramic view.

Figure 3
Case 1: tooth's sections.

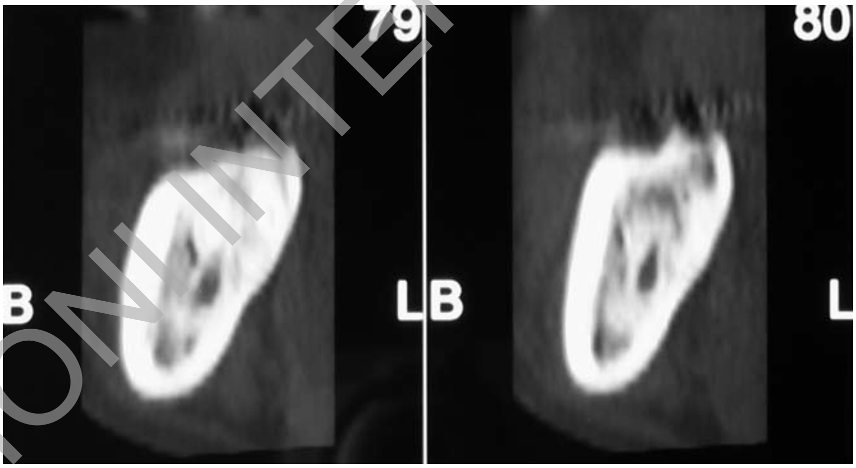

Figure 2
Case 1: pre-operative CT dentascan cross-sections.

nervous conduction without anatomical damage; a similar clinical picture was present in the third case, presumably following the stretching of the nerve caused by an apical hook.

Conclusions

Inferior alveolar nerve injuries are among the most severe complications that may emerge following the extraction of lower third molars, in terms of both the functional sequelae and the medico-legal repercussions. Although the current case study and

Figure 4
Case 2: pre-operative ortopanoramic view.

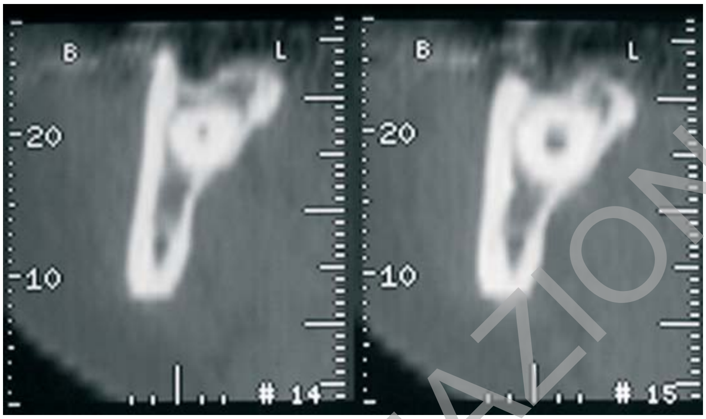

Figure 5
Case 2: pre-operative CT dentascan cross-sections.

Figure 6
Case 2: the extracted tooth.

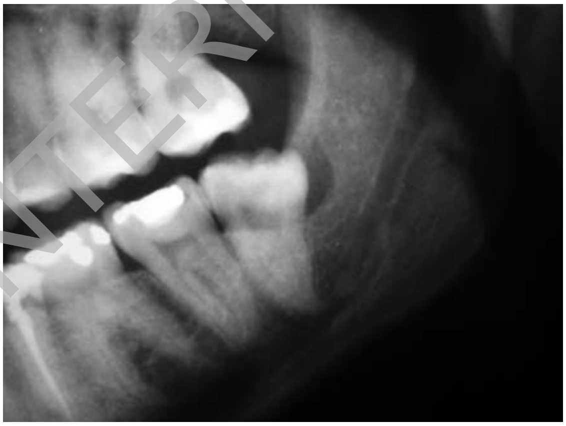

Figure 7
Case 3: pre-operative ortopanoramic view.

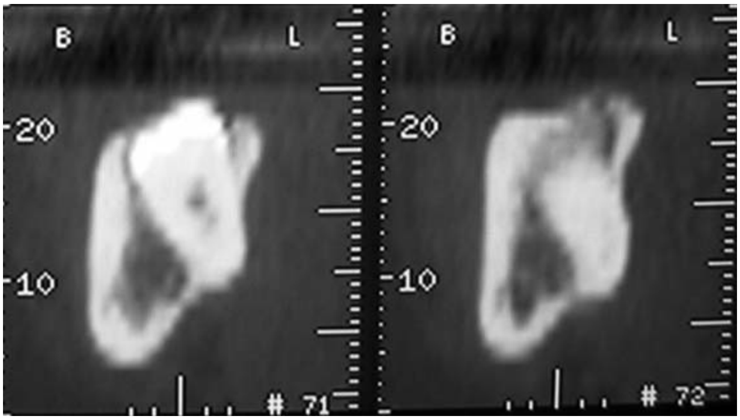

Figure 8
Case 3: pre-operative CT dentascan cross-sections.

Figure 9
Case 3: the extracted tooth.

the others present in the literature (3, 9, 10) demonstrate that the incidence of this outcome is rare compared to other complications, the risk of iatrogenic nerve injury is always present.
Oral surgeons now have an additional diagnostic tool aside from the traditional x-ray examination: CT dentascan. Precise three-dimensional assessment of the relationships between the lower alveolar nerve and the dental element enables an evaluation of surgical risk and the selection of the most suitable operative technique. On the other hand, it is true that close relationships of contiguity or continuity with the canal, aggravated by deep impaction, anomalous root morphology and unfavourable positions of the teeth, it may be practically impossible to avoid minor neurological sequelae.
Furthermore, even in the case of minimal risk of iatrogenic nerve injuries, it is imperative to inform the patient in detail of the possible consequences of such a procedure and to obtain valid informed consent.

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DENSE BONE ISLAND OF THE JAW: A CASE REPORT

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SUMMARY

Dense bone island of the jaw: a case report

The "Dense Bone Island" (DBI) is a radiopaque lesion referred in leterature as idiopathic osteosclerosis, enostosis, focal osteosclerosis, periapical osteopetrosis, and bone scar. The DBI are accidentally found in routinary Xray of bone structures. In the maxillary bones, often localized in the mandible, especially in the molar region, with a reported incidence ranging from 2.3 to 9.7%. DBI does not seem to develop until the first phase of adolescence and it is usually found in adolescents and in young adults. In 40% of cases DBI seems to increase in size after a 10 year follow-up, because the DBI found in jaws and in long bones seem to increase proportionally to the bone growth. A case of a 26 years old patient and the surgical treatment is presented. This is the first reported case where complete X-ray Orthopantomography follow-up showed the evolution of the lesion since its onset.

Key words: enostosis, radiopaque lesion, bone island.

RIASSUNTO

Dense bone island della mandibola: descrizione di un caso

La *Dense Bone Island* (DBI) è una lesione radiopaca descritta in letteratura come osteosclerosi idiopatica, enostosi, osteosclerosi focale, osteopetrosi periapicale, cicatrice ossea. La DBI è spesso riscontro casuale in radiografie di routine eseguite per altri motivi. Si localizza principalmente a livello della mandibola in regione molare con incidenza compresa tra il 2,3 e il 9.7%. Sembra che il suo sviluppo inizi dopo la prima fase dell'adolescenza. Il riscontro diagnostico avviene normalmente in soggetti adolescenti o giovani adulti. Nel 40% dei casi la DBI sembra aumentare di volume dopo circa 10 anni, probabilmente perché si accresce proporzionalmente alla crescita ossea. Viene presentato un caso di una paziente di 26 anni sottoposta a trattamento chirurgico. Il caso presentato è il primo caso in cui la lesione è stata documentata radiograficamente dal momento della sua insorgenza fino al trattamento chirurgico.

Parole chiave: enostosi, lesioni radiopache, bone island.

Introduction

A "Dense Bone Island" (DBI) is a localized, well-defined, radiopaque mass in the jaw with a round, elliptical or irregular shape and a variable size (1). Most of these lesions are asymptomatic, and represented casual finds in routine X-rays.
Although DBI has been reported with a variety of names including enostosis, bone scar, focal osteosclerosis, idiopathic osteosclerosis and periapical osteopetrosis, their cause and classification are controversial (2).
On radiographic evaluation, they are well separated from the surrounding normal bone, and smooth or irregular in outline.
Histopathologically, DBIs are composed of dense calcified tissue without marrow spaces and generally no inflammatory cell infiltration (3, 4). Most of the DBIs described in literature are smaller than 2 cm (2, 3); this leads to hypothesize that they may not reach the sufficient size to cause jaw expansion.

Case report

Twenty-six-year-old female patient, negative anamnesis for systemic diseases, showed no rele-

vant alterations at the intra- oral examination. The radiographic examinations (Orthopantomography, CT Dentascan), showed a 1cm osteocondensing lesion, localized under the left first lower molar (Figg. 1, 2).
The patient had radiographic examinations that showed the evolution of the lesion since its onset (Figg. 3, 4, 5).
In consideration of its remarkable increase in the last 10 years, and of an intermittent painful symptomatology, was decided to perform a surgical enucleation of the lesion.
Surgical treatment was performed under general anesthesia using ultrasonic device. DBI was removed preserving surrounding bone tissue and alveolar nerve (Figg. 6, 7). Notwithstanding the lack of cleavage plane between lesion and surrounding bone, precision and selective cut of ultrasound device allowed a conservative excision (Fig. 8). Microscopic examination showed cortical lamellar bone tissue partly sclerotized in the site of previous reworking, locally in continuity with porosus bone whose medulla spaces were occupied by vascularized loose fibrous tissue (Fig. 9).

Figure 1
Preoperative ortophantomography.

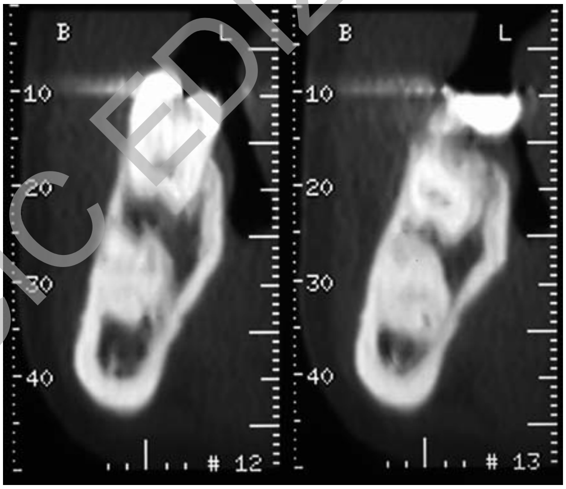

Figure 2
Detail of CT Dentascan in axial projection.

Figure 3
OPT Rx at 6 years of age with mixed dentition, absence of endosteal lesions.

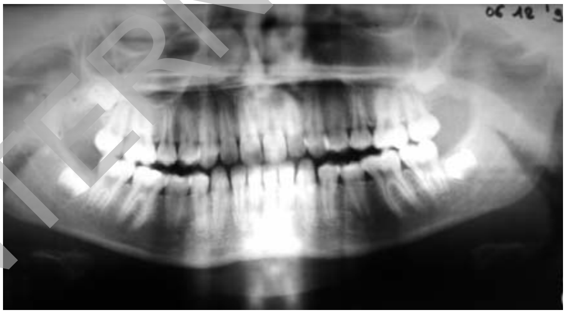

Figure 4
OPT Rx at 12 years of age, with permanent dentition, absence of endosteal lesions.

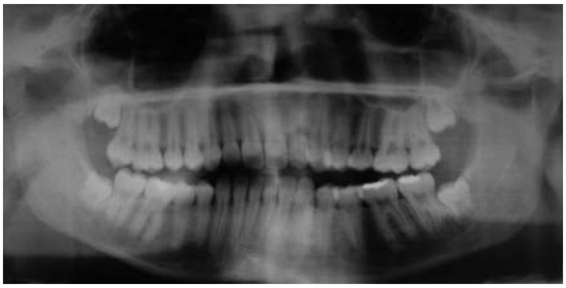

Figure 5
OPT Rx at 16 years of age, initial onset of endosteal lesion near the left first lower molar.

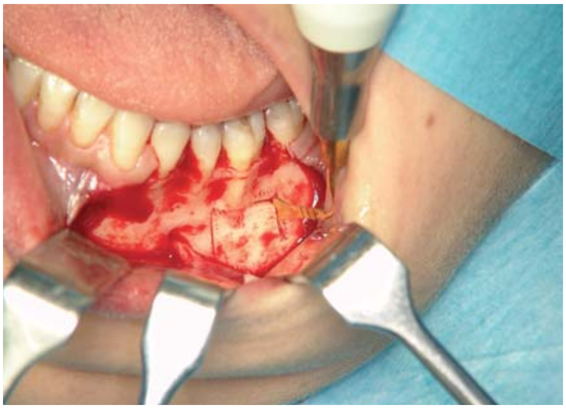

Figure 6
Osteotomy performed by ultrasound device.

Figure 8
Removed lesion.

Figure 7
Intraoral view showing precise and selective cut with complete excision of lesion.

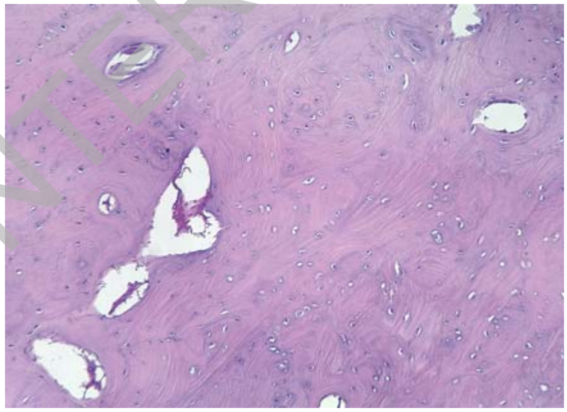

Figure 9
Histological section. Cortical lamellar bone tissue (HE, 10X).

The diagnosis made, in consideration of both the histological and radiographic examination of the lesion, was of solitary enostosis, known as "bone island".
No recurrence was showed in one year follow-up radiograph (Fig. 10).

Discussion

DBI are generally modest in size and do not change overtime (5). Mirra (6), presented the case

Figure 10
One year follow-up showing a prosthetic rehabilitation and good bone healing.

of a 5-year-old child with a lesion of 1.1 × 1.7 cm in the distal portion femur, initially considered as a DBI, whereas 6 months later the lesion had reached the size of 4.2 × 3.0 cm, and a biopsy showed evidence of osteosarcoma. The author suggests to perform an open surgery biopsy of DBI when the size of the lesion increases by 25% in 6 months or by 50% in one year.

DBI may be differentiated from more aggressive or malignant bone lesions by one of the following: absence of a primitive tumor, slow growth over a period of years, a clearly demarcated margin with thorny radiation from the sclerotic lesion and the absence of pain.

Petrikowski and Peters (1) noted that, for practical purpose, the calcifying encondroma, medullary bone infarct, healing non-ossifying fibroma, osteosarcoma and osteoid osteoma can be eliminate from the differential diagnosis of DBI.

Always according to Petrikowski and Peters (1), the age in which a DBI is found ranges between 9.4 and 14.0 years, whereas according to other studies, DBI seems to be more frequent in the third decade of life (7, 8).

Various therapeutic choices apply. If the lesion is an isolated radiopaque area without any connection with the teeth, and no painful symptomatology occurs, it is preferable not to surgically intervene.

When, the thick radiopaque area is associated to a secondary infection, through the element involved, the surgical procedures must be carefully carried out in order not to cause lesions to the surrounding areas.

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ORAL FOCAL MUCINOSIS: CASE REPORT

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SUMMARY

Oral focal mucinosis: case report

Oral focal mucinosis (OFM) is an uncommon disease of unknown aetiology. It is considered to be the oral counterpart of cutaneous focal mucinosis and cutaneous myxoid cyst and it is characterized by a focal myxoid degeneration of the connective tissue. A preoperative diagnosis is almost impossible, and the clinical suspicion, usually made by exclusion, must be confirmed by a bioptic examination followed by histological observations.
The Authors report a case of focal oral mucinosis diagnosed and treated in a male adult patient.

Key words: oral focal mucinosis, gingiva, biopsy.

RIASSUNTO

Mucinosi orale focale: caso clinico

La mucinosi orale focale è una patologia rara dall'eziologia sconosciuta. È considerata la manifestazione orale della mucinosi focale cutanea e della cisti mixoide cutanea. Caratterizzata da una degenerazione focale del tessuto connettivo. Una diagnosi preoperatoria non è possibile e il sospetto clinico, in genere fatto per esclusione, deve essere confermato da esame bioptico seguito da osservazione istologica. Gli autori descrivono un caso di mucinosi orale focale trattata in un paziente adulto.

Parole chiave: mucinosi orale focale, gengiva, biopsia.

Introduction

Oral focal mucinosis (OFM) is a rare disease that affects different localised areas of the mouth, where the connective tissue undergoes a focal degeneration. It has been described for the first time by Tomich in 1973 (1) and only few cases have been described in literature (2, 6), two of them observed on tongue (7). It is considered to be the oral expression of the focal skin mucinosis and myxoid skin cysts, thus presenting specific histological features (8). Focal skin mucinosis can be seen as a lesion of mesenchymal origin in which fibroblasts predominate. In oral focal mucinosis there is a hyaluronic acid overproduction by fibroblasts that reduce the production of collagen, elastic fibers, almost absent, and collagen fibers that disgregate and are replaced by varying amounts of mucin. Skin onsets seem not to be associated with oral lesions.

The diagnosis of OFM is usually made by exclusion: an area of similar myxoid tissue is found in the inflammatory fibroepithelial hyperplasia, lesion objectively characterized by inflammation and fibrosis (9). Differential diagnosis can be made with mixoma, that is expressed as an oral soft tissues lesion with compromise of the underlying bone, showing well circumscribed and distinguishable from surrounding tissue. OFM appears with rather blurred margins confusing with tissues that surround it, without damaging adjacent anatomical structures. Most of inflammatory lesions, such as gingivitis, fibrous hyperplasia,

epulis, pyogenic granuloma or tumors, such as peripheral fibroma and ossifying fibroma, and non-plaque associated lesions manifesting as a swelling gum, as mucocele, create differential diagnosis problems with focal oral mucinosis (10).
In any case, to confirm the clinical suspicion a bioptic examination followed by histological observations is needed.
OFM frequently affects women in a wide range of age, localizing in 80% of cases at the gum, generally in the jaw, and secondly in the palatal region, on the lips or tongue.
It clinically presents as a swelling that does not exceed 2 cm in diameter, sessile of firm consistency, that mimics in the surrounding mucosa for colour, and is generally asymptomatic.
The aetiology remains still now unknown. Surgical treatment is the unique therapy. OFM generally does not tend to give relapse.

Case report

A 35 years old male patient, non-smoker, with good oral hygiene and a swelling localized in the vestibular attached gingiva of the upper right central incisive (Figs. 1, 2) came to our observation. His medical and dental history was non-contributory. The rounded of about 10 mm in diameter lesion was sessile, with hard consistency, adherent to the underlying tissues and pinkish in colour. Surgery excisional biopsy was scheduled. Prior local anesthesia with 2% mepivacaine and vasoconstrictor 1:1.000.000, a partial thickness circular excision of the swelling, that presented bluish-grey in colour, was performed (Fig. 3). Macroscopic examination of the lesion did not give any indications for a diagnosis. Healing was asymptomatic and without recurrence at 6 months from surgery. Histological examination diagnosed a oral focal mucinosis (11).
At histological examination the lesion appeared to be as a myxoid tissue (Pas Alcian+) in which fusiform or stellate fibroblasts were immersed. The absence of flogosis and fibrosis excluded the inflammatory fibroepithelial hyperplasia (Figs. 4, 5) and permitted the diagnosis of oral focal mucinosis.

Figure 1
Intra-oral aspect of patient's mouth. An elevated mass can be observed located on the gingiva of the right upper central incisor.

Figure 2
Intra-oral particular of the gingival rounded lesion. At the clinical examination it appears to be sessile, with hard consistency, adherent to the underlying tissues and pinkish in colour. The lesion measured about 10 mm in diameter.

Figure 3
The site immediately after surgical excisional biopsy of the lesion.

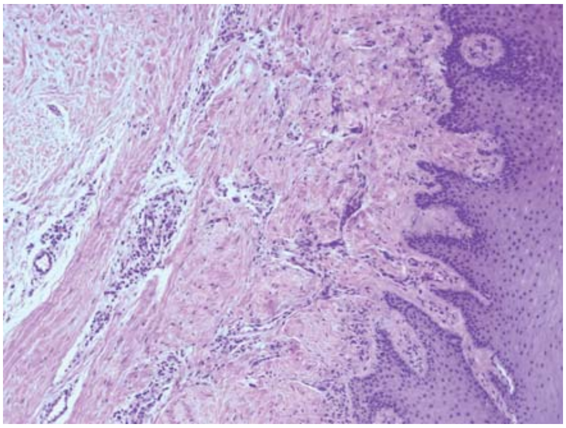

Figure 4
Histological examination of the lesion: paraffin section. The lesion appeared to be as a myxoid tissue (Pas Alcian +) in which fusiform or stellate fibroblasts were immersed 200X.

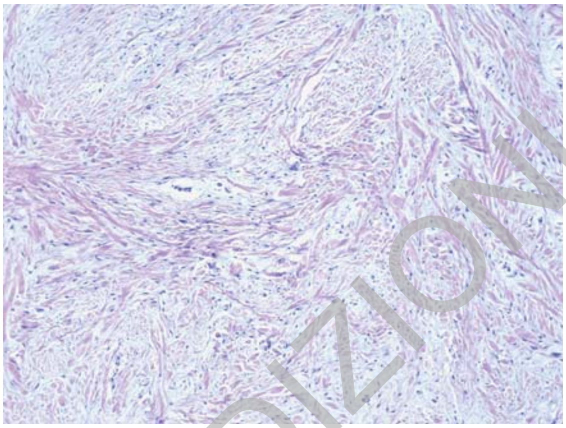

Figure 5
Histological examination of the lesion: 500X.

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