Case Report Maxillary Implant

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Extraction, site preservation and delayed placement of maxillary implant using the bone added osteotome sinus floor elevation technique.

Initial Presentation
Pt is a 28 y.o. female, medically healthy, denies taking any medications, reports a heavy smoker, NKDA’s. A cone-beam computerized tomographic scan was acquired pre-operatively.

A prophylaxis was completed was performed.

Extraction and Site Preservation
Pt was pre-medicated, one day pre-operatively, with 4mg Methadone (1 week dose pack) and 875+125 mg Augmentin, two times daily for 9 days. Atraumatic tooth extraction on #3 (Eu.#16) was performed using a piezotome. The deficient alveolar socket on #3 (Eu.#16) was carefully enucleated, soft tissues were manipulated and 0.7cc DFDBA (Demineralized Freeze Dried Bone Allograft) and (15x30mm) X-San Fascia Lata membrane were placed. DFDBA vs FDBA was placed on the extraction site to facilitate greater new bone formation.* DFDBA was hydrated with physiologic saline. Fascia Lata membrane was allowed to be soaked into saline for 40-15 minutes. Allograft ID stickers are always kept for traceability purposes.

Primary closure was achieved with minimal tension. Post op instructions were given. Sutures were removed 2 weeks after the site preservation was performed.

Implant Placement
Three months later, pt was pre-medicated 1 day pre-operative- ly with 875+125 mg Augmentin, two times daily for 9 days and an implant (3x11.5mm) was placed flapless. An internal sinus technique was performed using osteotomes instruments and 0.25cc FDBA (Freeze Dried Bone Allograft). The technique employed a specific set of osteotomes instruments to tent the sinus membrane with bone allograft material placed through the osteotomy site. Implant survival expected to be high since preexisting bone height between the sinus floor and crest was more than 5mm.‡ Fixture stability>45N/cm allowed for a healing abutment to be placed (Stage I). Post op instructions and sinus precautions were given.

CT/Scan and Restoration
Three months later a maxillary C.T/Scan was prescribed to verify the amount of floor elevation achieved. Soon after an implant supported crown was fabricated and delivered, Pt was placed on a 6-month periodontal and restorative recall.

Results
Pre-treatment the alveolar dimensions of the first maxillary molar were 12mm width× 8mm height and 3 months post fixture placement the ridge dimensions were 9mm width× 7.5mm height. Verifiled with the cone-beam computerized tomographic scan a 4mm internal sinus lift was achieved using FDBA (Freeze Dried Bone Allograft) and osteotome instruments.

Conclusions
Ridge dimensions can be preserved on extracted molar teeth with deficient alveolar architecture. Successful site preservation can favor placing fixtures flapless decreasing patients morbidity and chair time. Internal sinus lift with the bone added osteotome sinus floor elevation technique is a successful procedure. The FDBA placed into the maxillary sinus cavity appears to surround circumferentially the implant having intimate contact with it.

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References

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Stem cells in implant dentistry

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The human body contains over 200 different types of cells, which are organised into tissues and organs that perform all the tasks required to maintain the viability of the system, including reproduction. In healthy adult tissues, the cell population size is the result of a fine balance between cell proliferation, differentiation, and death.

Following tissue injury, cell proliferation begins to repair the damage. In order to achieve this, quiescent cells (dormant cells) in the tissue become proliferative, or stem cells are activated and differentiate into the appropriate cell type needed to repair the damaged tissue. Research into stem cells seeks to understand tissue maintenance and repair in adulthood and the derivation of the significant number of cell types from human embryos.

It has long been observed that tissues can differentiate into a wide variety of cells, and in the case of blood, skin and the gastric lining the differentiated cells possess a short half-life and are incapable of renewing themselves. This has led to the idea that some tissues may be maintained by stem cells, which are defined as cells with enormous renewal capacity (self-replication) and the ability to generate daughter cells with the capacity of differentiation. Such cells, also known as adult stem cells, will only produce the appropriate cell lines for the tissues in which they reside (Fig. 1).

Not only can stem cells be isolated from both adult and embryo tissues; they can also be kept in cultures as undifferentiated cells. Embryo stem cells have the ability to produce all the differentiated cells of an adult. Their potential can therefore be extended beyond the conventional mesodermal lineage to include differentiation into liver, kidney, muscle, skin, cardiac, and nerve cells (Fig. 2).

The recognition of stem cell potential unearthed a new age in medicine: the age of regenerative medicine. It has made it possible to consider the regeneration of damaged tissue or an organ that would otherwise be lost. Because the use of embryo stem cells raises ethical issues for obvious reasons, most scientific studies focus on the applications of adult stem cells. Adult stem cells

> Page 38
are not considered as versatile as embryo stem cells because they are widely regarded as multipotent, that is, capable of giving rise to certain types of specific cells/tissues only, whereas the embryo stem cells can differentiate into any types of cells/tissues. Advances in scientific research have determined that some tissues have greater difficulty regenerating, such as the nervous tissue, whereas bone and blood, for instance, are considered more suitable for stem cell therapy.

In dentistry, pulp from primary teeth has been thoroughly investigated as a potential source of stem cells with promising results. However, the regeneration of an entire tooth, known as third dentition, is a highly complex process, which despite some promising results with animals remains very far from clinical applicability. The opposite has been observed in the area of jawbone regeneration, where there is a higher level of scientific evidence for its clinical applications. Currently, adult stem cells have been harvested from bone marrow and fat, among other tissues. Bone marrow is haematopoietic, that is, capable of producing all the blood cells. Since the 1950s, when Nobel Prize winner Dr. E. Donnall Thomas demonstrated the viability of bone marrow transplants in patients with leukaemia, many lives have been saved using this approach for a variety of immunological and haematopoietic illnesses. However, the bone marrow contains more than just haematopoietic stem cells (which give rise to red and white blood cells, for example); it is also home to mesenchymal stem cells (which will become bone, muscle and fat tissues, for instance; Fig. 5).

Bone marrow harvesting is carried out under local anaesthesia using an aspiration needle through the iliac (pelvic) bone. Other than requiring a competent doctor to perform such a task, it is not regarded as an excessively invasive or complex procedure. It is also not associated with high levels...
of discomfort either intra or post-operatively (Figs. 5a & b).

Bone reconstruction is a challenge in dentistry (also in orthopaedics and oncology) because rebuilding bone defects caused by trauma, infections, tumours or dental extractions requires bone grafting.

The lack of bone in the jaws may impede the placement of dental implants, thus adversely affecting patients’ quality of life.

In order to remedy bone scar- city, a bone graft is conventionally3 harvested from the cranial region or the angle of the mandible. If the amount required is too large, bone from the skull, legs or pelvis may be used. Unlike the process for harvesting bone marrow, the process involved in obtaining larger bone grafts is often associated with high levels of discomfort and, occasionally, inevitable post-operative sequelae (Figs. 5a–e).

The problems related to bone grafting have encouraged the use of bone substitutes (synthetic materials and bone from human or bovine donors, for example). However, such materials show inferior results compared with autologous bone grafts (from the patient himself/herself), since they lack autologous proteins.

Therefore, in critical bone defects, that is, those requiring specific therapy to recover their original contour, a novel concept to avoid autologous grafting, involving the use of bone-sparing material combined with stem cells from the same patient, has been gaining ground as a more modern philosophy of treatment. Consequently, to the detriment of traditional bone grafting (with all its inherent problems), this novel method of combining stem cells with mineralised materials uses a viable graft with cells from the patient himself/herself without the need for surgical bone harvest-
ing.

Until recently, no studies had compared the different methods available for using bone marrow stem cells for bone reconstruction. In the following paragraphs, I shall summarise a study conducted by our research team, which enabled the creation of critical bone defects in rabbits and subsequently applying each of the four main stem cell methods used globally in order to compare their effectiveness in terms of bone healing:

1. fresh bone marrow (without any kind of processing);
2. a bone marrow stem cell concentrate;
3. a bone marrow stem cell culture; and
4. a fat stem cell culture (Figs. 6 & 7).

Evidently, although bone mar-row stem cell techniques for bone reconstruction are very close to routine clinical use, much caution must be exer-cised before indicating such a procedure. This procedure requires an appropriately trained surgical and laboratory team, as well as the availability of the necessary resources (Figs. 11a–b), taken during laboratory manipulation of marrow stem cells at São Leopoldo Mandic dental school in Brazil.

References


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