Journal of Chemical Health Risks

www.jchr.org

JCHR (2025) 15(5), 666-671 | ISSN:2251-6727

Tooth Gone, Bone Reborn!!

Dr. Ashish Choudhary, Dr. Nitika Bansal, Dr. Rashi

School of Dental Sciences, Sharda University, Greater Noida, Uttar Pradesh, India.

(Received: 16 July 2025 Revised: 20 August 2025 Accepted: 02 September 2025)

KEYWORDS

Dentin chips, bone loss, autologous, graft, extracted teeth, rapid grafting.

ABSTRACT:

In regions of the jaws where bone loss has occurred, density and volume are restored using a dental bone graft. The material for the bone graft may be obtained from an animal tissue bank (xenograft) or a human tissue bank (allograft). or derived (autogenous) from your own body. After being mechanically cleaned and disinfected, extracted teeth are used in dentistry as particulate autologous dentin for rapid grafting of the extraction site.

1. Introduction

Dentine makes up 80% of a human tooth, 15% is enamel, 5% is cementum, and 5% is pulp. The main component, dentin, has a composition that is remarkably comparable to bone because of its tubular design and high mineral phase. The morphogenetic protein found in dentin has the capacity to encourage the formation of new bone and permit that bone to gradually replace existing bone without triggering an inflammatory reaction. Biomaterials are applied to soft and hard tissues to repair defects. Synthetic materials are less expensive and pose no biological danger, but they can only be used to create functional bone since they lack the ability to induce and initiate osteogenesis. Dental extractions are among the most common therapeutic operations, however even after they are removed, the teeth are still discarded since they are deemed biologically worthless and wasteful.

As a result, type I collagen found in microtubules promotes healing, bone morphogenetic proteins (BMPs) give the particulate tooth a high osteoconductive capability, and its tubular form makes it an excellent osteoinductive graft material. It is an excellent replacement for autologous bone and seems to have a better tissue response than synthetic and heterologous transplants. Because it contains about the same amount of organized phosphorus (TCP and hydroxyapatite) and calcium ions as human bone, dentin can be used as an autograft. Growth factors and type I collagen are abundant in its organic phase. Dentin is regarded as a material for grafts due to its arrangement in microtubules, which promote osteoconduction and permit bone formation. This behavior sets it apart from other graft types or xeno-derivatives. Due to its inciting qualities, dentin merges, gradually replaces, and creates neoformation in the bone. According to a 2013 study, the dentin's embedded NCP (non-collagen proteins) stimulated the creation of new bone, as seen by the histological examinations that showed signals of new bone growth at two weeks. A 2018 study confirmed that the chemical composition of tooth particles crushed with a Smart dentin grinder was unmistakably similar to real bone. Another study in dogs supports the formation of both immature and lamellar bone in the context of incomplete alveolar healing. It also shows that significantly more bone formation was observed in areas filled with dentin, resulting in a large amount of new bone formation at 60 days and a small amount of lamellar bone at 90 days of healing. Since human teeth can be recycled and used as a new graft material for bone regeneration, several authors have shown that the properties of crushed teeth can act as a substitute for bone produced by dentin and dentin pulp.

2. Case Report

A 50 year old man reported to The Department of Prosthodontics and Crown & Bridge with the chief complaint of mobility in lower front teeth. Patient was explained about the treatment options for the rehabilitation of lower anterior teeth and an informed written consent was taken for the same. A pre-operative orthopantogram (OPG) (fig1a)and an intraoral periapical radiograph (IOPAR) was taken (fig.1b). Intraoral pictures were also taken to design a treatment plan(fig.2). The treatment plan was modified to increase the crestal bone height using dentinal chips.

Journal of Chemical Health Risks
www.jchr.org
JCHR (2025) 15(5), 666-671 | ISSN:2251-6727

Figure 1(a) Preoperative OPG

Figure 1(b) Preoperative IOPAR

Figure 2 Preoperative intraoral picture

3. Method

Firstly, atraumatic extraction of the non-restorable teeth was done, preserving the bone structure of the face plate (fig.3a, b). Dentinal chips were used to prepare the edentulous site for socket preservation after the socket had been debrided with a curette and irrigated with mouthwash containing 0.1% octenidine. To facilitate the viewing of the socket sites and any irregularities in the bone contour, lingual and facial envelope flaps were designed. The Smart Dentin Grinder's base had a disposable chamber and blade device attached to it. Following that, the roots were cleaned and allowed to air dry close to the blades (fig. 4). The roots were ground and sorted to a particular range of particle size in about three seconds, gathering in the catch drawer. After grinding was finished, the freshly made autogenous graft material was inserted into the glass jar that was given, together with KometaBio Dentin Cleanser (fig 5). This cleanser, a high pH (very basic) sodium hydroxide in 20% ethanol, is used to cleanse the particulate for 10 minutes to eliminate bacteria and any organic material. After the particulate completed soaking, the cleanser was removed. This is done by pouring out the excess liquid or by using sterile absorbent gauze. Next, a Dentin Wash (KometaBio), consisting of a phosphate-buffered saline, was poured onto the tooth particulate for 3-5 minutes. following this second soaking, as much of the liquid wash as possible was removed by pouring out the excess, and the rest was absorbed with gauze. The graft was now ready for use. The particulate graft was easy to transfer to the socket site because it was slightly hydrated. The sockets were packed firmly (n0t condensed) with the autogenous graft (figure 6). The site was secured with sutures (figure 7). A cone beam computer tomography scan was taken immediately post procedure (figure 8).

Figure 3(a) Occlusal view of extracted sockets

Figure 3(b) Extracted teeth. (Note: Root canal teeth shouldn't be used for this procedure.)

Journal of Chemical Health Risks
www.jchr.org
JCHR (2025) 15(5), 666-671 | ISSN:2251-6727

Figure 4: The extracted teeth were cleaned, dried, and then placed inside the chamber of the Smart Dentin Grinder. It took only three seconds to grind the teeth down to the proper size, and another twenty seconds to sort them.

Figure 5: After that, the particle was cleansed using a Dentin Wash (KometaBio) and Dentin Cleanser (KometaBio). These teeth produced roughly 10 cc of particle matter between 300 to 1200 microns.

Figure 6 Autogenous bone graft in-situ.

Figure 7 Sutured Flap

Figure 8 A post-operative CBCT analysis

The dentin graft particle was integrated for three months before the edentulous location was assessed to ensure adequate healing. The tissue health was judged to be extremely satisfactory. A healing detachable transitional partial appliance was being worn by the patient (figure 9). A CBCT examination performed three months after surgery revealed the development of new bone in the socket locations. Evaluation was done on the crestal bone. To make the location visible, a face and lingual flap was constructed. In order to set up an eventual implant-retained prosthesis, three MIS implants were implanted strategically (figure 10). Excellent levels of bone quantity and quality were observed. During the osteotomy preparations, bleeding occurred, and the bone density seemed normal. The site was sutured back together after the implant was placed. A cone beam computer tomography scan was taken immediately post procedure (figure 11). After the implants were inserted, impressions were taken, and on the same day, a temporary prosthesis was provided (figure 12).

Figure 9 Removable Transitional Partial Appliance

Journal of Chemical Health Risks
www.jchr.org
JCHR (2025) 15(5), 666-671 | ISSN:2251-6727

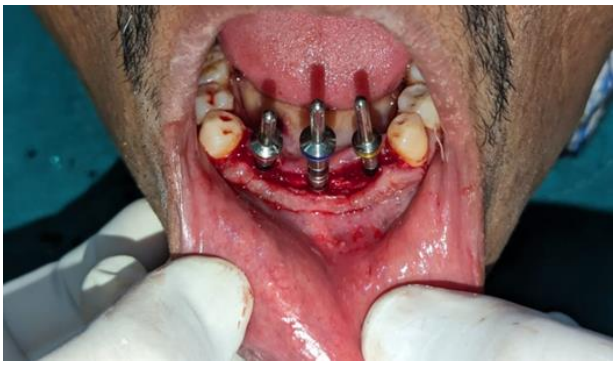


Figure 10 Implant Placement

Figure 11 Post -operative CBCT

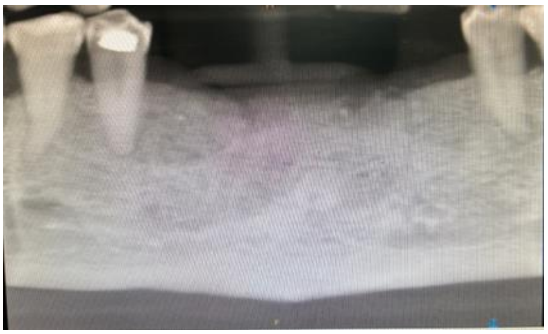
Figure 12 Prosthodontic rehabilitation with temporary prosthesis.

4. Results

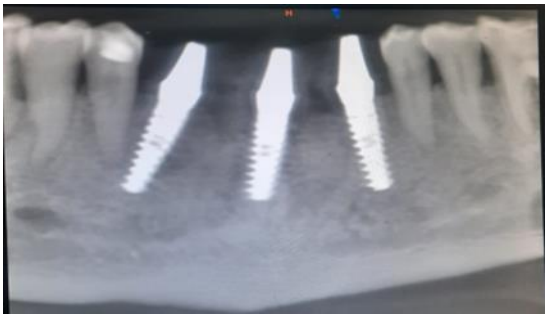
A comparative evaluation among the pre-operative, post socket preservation with dentinal chips, after 3 months and post implant placement were compared to check the outcome of the decided treatment.

PRE-OPERATIVE

POST SOCKET PRESERVATION



AFTER 3 MONTHS



POST IMPLANT PLACEMENT

Journal of Chemical Health Risks
www.jchr.org
JCHR (2025) 15(5), 666-671 | ISSN:2251-6727

5. Discussion

A common and significant way to preserve the quantity and quality of bone is through bone grafting and basic socket preservation treatments. This procedure can be crucial if dental implants are being considered in the future. Without a doubt, implant dentistry has emerged as a competitive alternative to traditional dentistry methods. Dental implants are a great way to fulfill our patients' requests for long-term solutions to their dental problems. The patient's acceptance or predictability of transplant surgeries was not always assured in the past. However, the procedure has become standardized and very predictable due to the availability of premium materials and the realization that any transplant must be protected from epithelial tissue. Dentin can be used as a material to cure bone abnormalities and alveolar therapy in place of autogenous bone. Due to their chemical makeup and quantity—after grinding teeth, the resulting material can increase in quantity up to three times its original volume— dentine particles can be considered to be a possible material for bone regeneration. Enough material is provided by the extracted mandibular laterals, or two incisor teeth, to fill four vacant mandibular sockets.. Patients who do not wish to get allografts or xenografts can also use it as an option because it has good biocompatibility and does not trigger an immunological response, viral reaction, or reaction to foreign material. Osteoinduction, osteoconduction and progressive replacement are possible with autogenous mineralized dentin particles implanted immediately after extraction. They are also available in different sizes.

The transplant option described here can provide excellent clinical results and improve patient acceptance, since it is an autogenous graft that does not require a separate surgical site, despite the apparently better choice of materials. Considering the operating costs and the amount of particles generated, dentin grafting is very cost-effective for bigger defect instances when multiple implant sites are grafted. Compared to other existing transplant choices, it saves money and yields great clinical results.

The most effective method for success has long been thought to be autogenous bone transplants. It was not very practical to do this, though, as it meant taking bone out of another area of the body or the mouth. Grading in preparation for dental implants is definitely something to take into consideration, as we now have a method to make an autogenous graft using the patient's own teeth.

Graft	Definition	Advantages	Disadvantages	Examples
Autogenous bone	The patient's own bone	Excellent biocompatibility, bone conductivity, and bone induction and contains living osteoblasts	Needs additional surgery, which can cause complications such as nerve damage or arterial injury	Cortical or cancellous bone
Allogeneic bone	A graft derived from a genetically dissimilar member of the same species as the recipient	Has various tissue cells, growth factors, extracellular matrix, and other factors	Antigenic and low risk of spreading disease	Cadaver cortical or cancellous bone, FDBA, DFDBA
Xenogeneic bone	Grafts taken from a genetically different species than the recipient	High volume, and some grafts have excellent bone conductivity	Highly antigenic and high risk of spreading disease	Bio-Oss, coralline HA, red algae

Journal of Chemical Health Risks

www.jchr.org

JCHR (2025) 15(5), 666-671 | ISSN:2251-6727

*Dentinal chips	The patient's own tooth/teeth	Can be produced and stored in large quantities. biocompatibility, bone conductivity, bone induction , contains bone morphogenic proteins, Less cross-infection and immune response.	Root canal treated tooth/teeth cannot be used	

6. Conclusion

As an alternate material for sinus lifting, split method, and socket preservation, particulate dentin grafts should be taken into consideration. Dentin graft performance is equivalent to widely utilized xenogeneic or allogenic biomaterials in terms of both clinical and histological outcomes.

References

1. **Young-Kyun Kim, et.al. -** Tooth-derived bone graft material J Korean Assoc Oral Maxillofac Surg. 2013 Jun; 39(3): 103–111
2. **Alexander Welk, Maral Zahedani, Carolin Beyer, Axel Kramer, Gerald Müller** Antibacterial and antiplaque efficacy of a commercially available octenidine-containing mouthrinse Welk A, Zahedani M, Beyer C, Kramer A, Müller G. Antibacterial and antiplaque efficacy of a commercially available octenidine-containing mouthrinse. Clinical oral investigations. 2016 Sep;20:1469-76.
3. **Vijay Ebenezer, K. Balakrishnan, R. Vigil Dev Asir, Banu Sragunar** Immediate placement of endosseous implants into the extraction sockets J Pharm Bioall Sci 2015;7:S234-7.
4. **Daniele Cardaropoli, Myron Nevins, Peter Schupbach** New bone formation using an extracted tooth as a biomaterial: a case report with histologic evidence int j periodontics restorative dent 2019;39:157-163 Lia ZC, White SN. Mechanical properties of dental luting cements. The Journal of prosthetic dentistry. 1999 May 1;81(5):597-609.
5. **Kabi S, Kar R, Samal D, Deepak KC, Kar IB, Mishra N.** Immediate dental implant placement with or without autogenous bone graft: A comparative study. Natl J Maxillofac Surg. 2020 Jan-Jun;11(1):46-52.
6. **Sánchez-Labrador L, Martín-Ares M, Ortega-Aranegui R, López-Quiles J, Martínez-González JM.** Autogenous dentin graft in bone defects after lower third molar extraction: a split-mouth clinical trial. Materials. 2020 Jul 10;13(14):3090.
7. **José Luis Calvo-Guirado, Miguel A. Garcés-Villalá, Lanka Mahesh, Felix A. De Carlos-Villafranca** Effectiveness of Chemical Disinfection in Discarding Pathogenic Bacteria of Human Particulate Tooth Graft: An *In vitro* Study Calvo-Guirado JL, Garcés-Villalá MA, Mahesh L, De Carlos-Villafranca FA. Effectiveness of chemical disinfection in discarding pathogenic bacteria of human particulate tooth graft: An *in vitro* study. Indian J Dent Sci 2021;13:277-82.
8. **Witchayani Bungthong , Parinya Amornsettachai , Penporn Luangchana , Boontharika Chuenjitkuntaworn and Suphachai Suphangul ,** Bone Dimensional Change Following Immediate Implant Placement in Posterior Teeth with CBCT: A 6-Month Prospective Clinical Study Faculty of Pharmacy Mahidol University (MU-DT/PY-IRB2018/035.2106).