Case Report

Management of retrograde peri-implantitis subsequent to replacement of a mandibular incisor

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The need to replace missing teeth is one of the most common demands a dentist will encounter in clinical practice. Teeth are lost due to a number of causes, notably tooth decay and/or advanced periodontal disease with subsequent extraction or untenable circumstances due to clinical or patient factors where successful restorative treatment would have otherwise eliminated the need for extraction. Tooth loss may also occur due to trauma and in some instances, teeth maybe congenitally missing.
The missing teeth must be replaced to restore function and aesthetics. Dental implants provide an excellent option for tooth replacement with accomplishment of good function and restoration of aesthetics without the need to involve the remaining dentition as abutments. For this reason, dental implants are becoming a mainstay in tooth replacement; not withstanding the challenges of implant surgery and restoration.

This case report details the process of restoration of a missing mandibular lateral incisor using an implant-supported prosthesis and the surgical management of the ensuing retrograde peri-implantitis.

Patient particulars and presenting complaint

The patient, a 30 year old Ugandan male in good general condition, first presented to our practice approximately 12 hours after he was involved in an accident (a fall) during which he suffered trauma to the upper and lower front teeth with avulsion of 42*, for which he wanted a fixed replacement.

Medical and social history

The patient was a non-smoker with no known history of chronic illnesses notably diabetes, hypertension and allergies. A review of other systems elicited no abnormal findings in the CVS, CNS, GIT, Respiratory and musculoskeletal systems.

Examination findings

The patient had fairly good oral hygiene. Grade II mobility of the 11 and 21 was noted. The soft tissue injuries were managed accordingly and the 11 and 21 were immobilized using composite splinting for 4 weeks. The patient was reviewed after 2 months for pre-implant placement assessment.

** FDI Nomenclature used in tooth description*

PA X-ray after 2 months

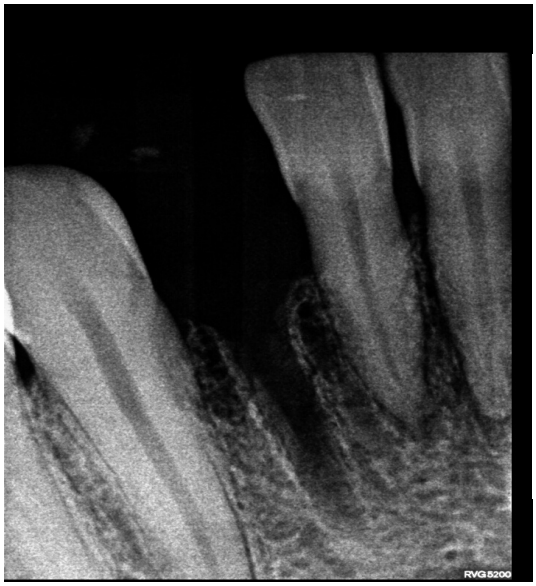


Fig. 1

This PA X-ray of the socket of the 42 taken 2 months after the avulsion shows bone healing in its early stages. The absence of new bone formation in the socket at this stage, coupled with the loss of a significant amount of buccal plate due to trauma, means that guided bone regeneration (GBR) would be necessary at implant placement.

Photographs

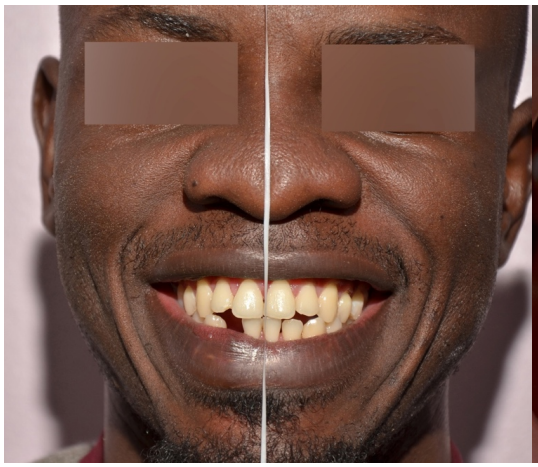


Fig. 2

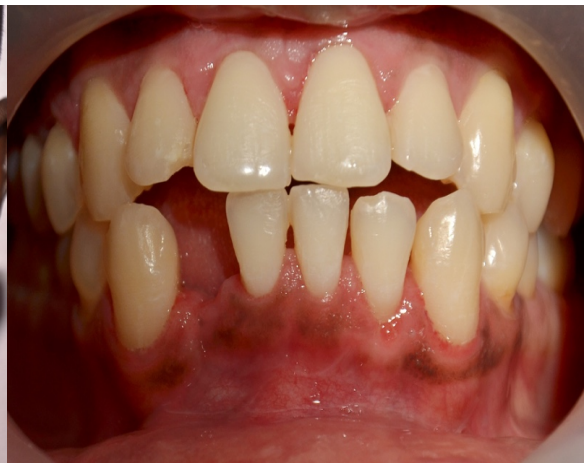


Fig. 3

Treatment Planning

Fig. 4

*(**Fig. 2 and 3**.) The extra-oral and Intra oral photographs; note the floss in fig. 2 used as a symmetrical guide during the photography. The study casts and wax up as part of the treatment planning **(fig. 4)**. In centric occlusion, the 42 is in open bite.*

Implant space analysis with CBCT

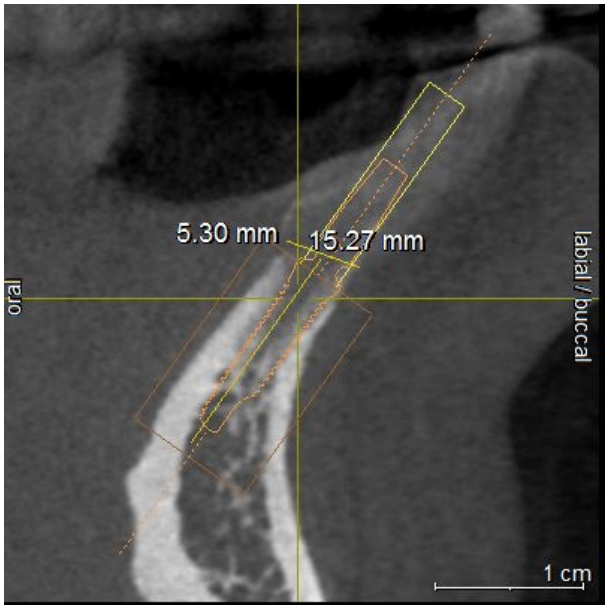


Fig. 5

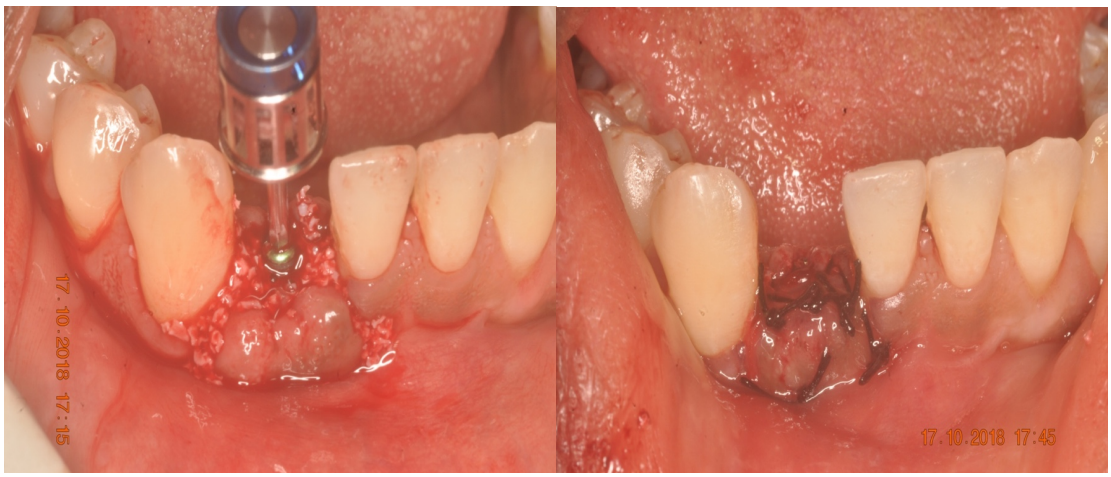
Guided by the CBCT analysis, a 3.1 by 13 Megagen intermezzo mini implant was selected.

Surgical protocol and Drilling sequence

Observing asepsis and strict cross infection control protocol, an incision was made in the midline of the bucco-lingual dimension of the ridge. The incision was extended gingivally to the midline of the facial aspect of both the 43 and 41 with no relieving incisions. Using a periosteal elevator, the flap was gently teased off the buccal plate exposing the bone and the implant site.

At the midpoint in the mesial-distal dimension, a pilot drill (Lance drill) was used for decortication. This was followed by a 2.0 drill to 13mm. The drill was oriented in the plane on the long axis of the opposing 12, so as to ensure subsequent axial loading of the implant. A direction indicator was then placed into the osteotome to assess the axial positioning. The drilling was done from sizes 2.0 to 2.5 and 2.8.

Implant placement and Bone grafting



*(**Fig. 6. (Left)** A 3.1 by 13mm Megagen Implant was placed and torqued down to 25Ncm. Bone grafting using Hypro-Oss 0.5-1.0 mm particle size -Natural hydroxyapatite + Atelocollagen composite for bone substitution was done. **Fig.7 (Right)** A Platelet Rich Fibrin Membrane (PRF) prepared from the patient's blood was placed over the graft with a cover screw and closure done with 3/0 Vicryl suture.)*

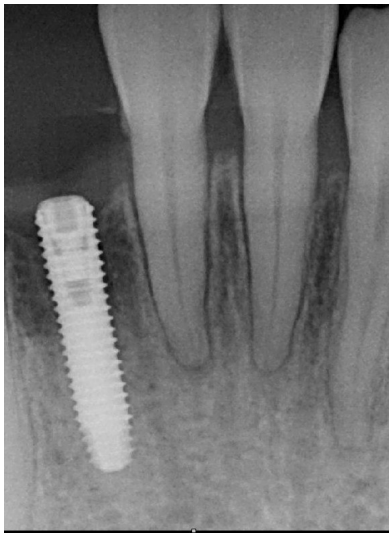


Fig. 8

PA X-ray of the 42 taken immediately after implant placement. Note the bone graft material evident in the crestal region of the implant.

Post implant placement review

After implant placement, the patient was discharged with oral antibiotics and analgesics. There was no incidence of pain, swelling or suppuration following implant placement. The osseo-integration phase was uneventful with remarkable soft tissue healing around the implant site.

3 months after placement, the cover screw was removed and a healing abutment was placed for 2 weeks. Due to the initial extent of the bone loss, there was a deficiency of soft tissue to form a significant soft tissue cuff and therefore the screw retained implant crown was designed to have a gum colored acrylic extension to compensate for this shortfall and improve aesthetics (*Fig 9*).

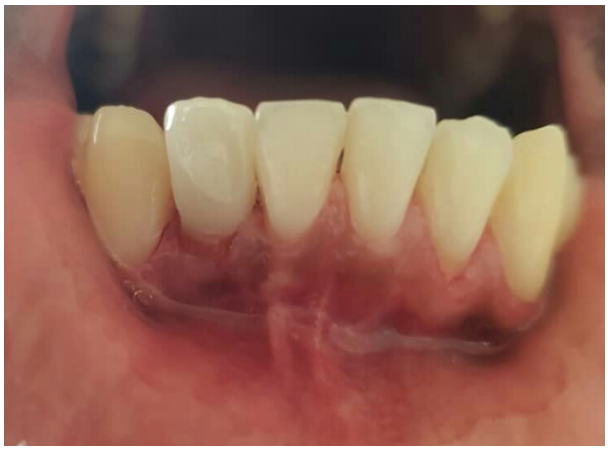


Fig. 9 *Note the pink acrylic extension on the implant crown*

Case follow up

A radiolucency was discovered as an incidental finding on X-ray two months post implant placement and closely monitored.

Three months after the implant was placed, another x-ray revealed that the apical lesion around the implant had enlarged significantly but had remained asymptomatic.

Percussion and manipulation of the implant did not elicit any pain or discomfort from the patient. There was no loss of implant stability.

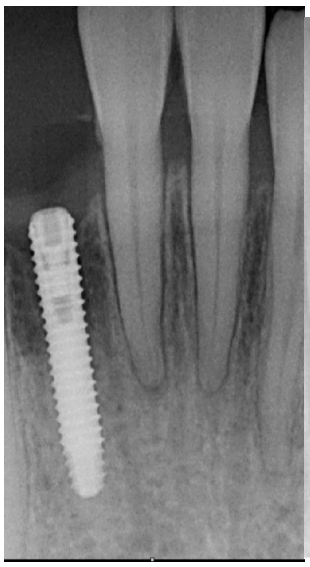


Fig. 10

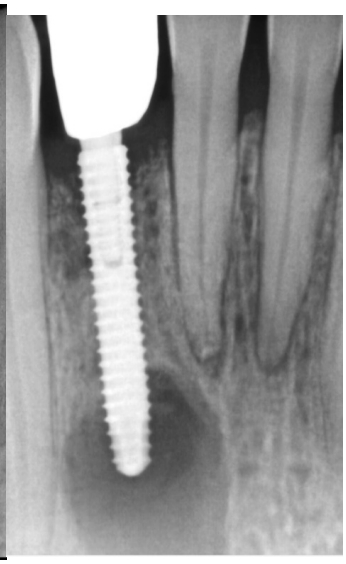


Fig. 11

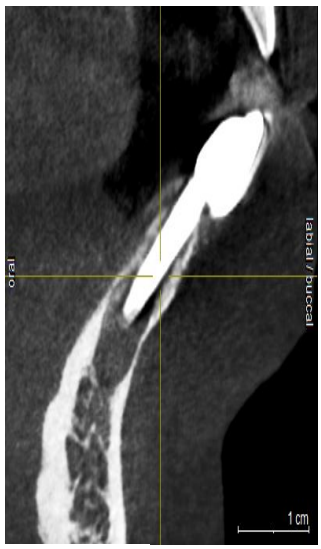


Fig. 12

Fig. 10-12. *Comparison of the implant at placement (fig.10), the radiolucency seen three months post placement (fig.11) and appearance on CBCT (fig 12).*

Management of the Apical Peri-implantitis

From the above findings, a diagnosis of Apical Peri-implantitis (retrograde peri-implantitis) was made. Since there was no loss of implant stability, the implant was not extracted.

Surgical Procedure

Before the procedure the patient was asked to rinse with a chlorohexidine gluconate mouthwash.

Observing asepsis and strict cross infection control protocols and under local anesthetic, a sub-marginal incision was made in the region of the mucogingival junction of the 42 ensuring papillary preservation.

Relieving incisions were made to raise a wide based trapezoid flap with good visibility and access to the apical region of the implant.

Using a sterile surgical bur with a cooling current of saline to prevent overheating, the alveolar bone over the lesion was gently removed and curettage done to remove the lesion (fig 13).

The apical lesion was found to be a soft pliable circular mass measuring 1 cm in its widest diameter (fig 14).

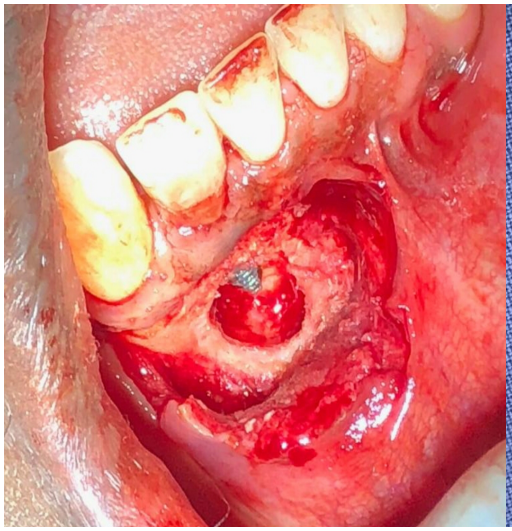


Fig. 13

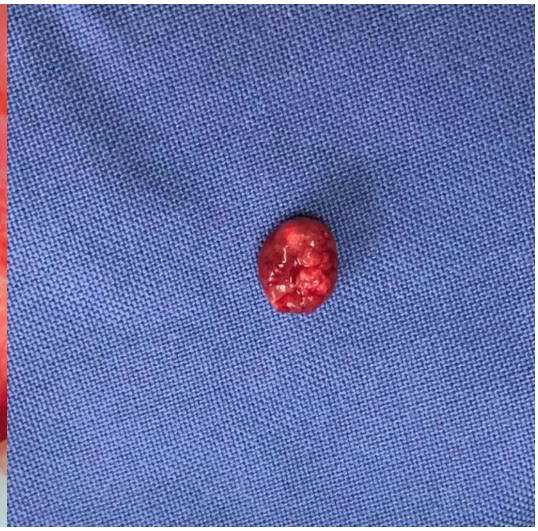


Fig. 14

After thorough curettage and irrigation with saline, the implant surface was treated with a 30% solution of citric acid of PH 1 applied for 60 seconds. The citric acid has been found to be a more effective means of chemical decontamination of the implant surface.

Bone grafting in the bony cavity and around the implant apex was done using *Geistlich Bio-Oss Pen* spongiuous bone substitute, small granules 0.25mm-1mm, 0.25g. A *Hypro-Sorb* (Atelo-collagen type 1) 25X25X2 membrane was then placed over the graft material. (Fig 15.)

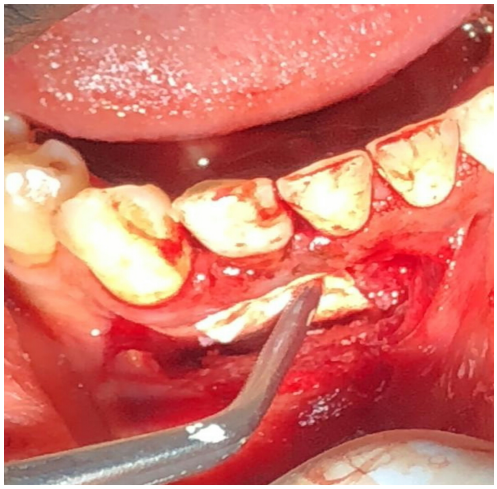


Fig. 15

Hemostasis was adequately achieved. Closure to reposition the flap over the membrane was done using 6/0 braided silk suture in interrupted suture (Fig 16). The sutures were removed one week later (Fig 17).

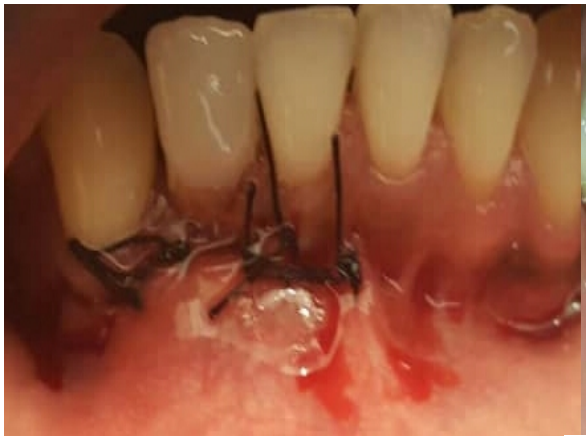


Fig. 16

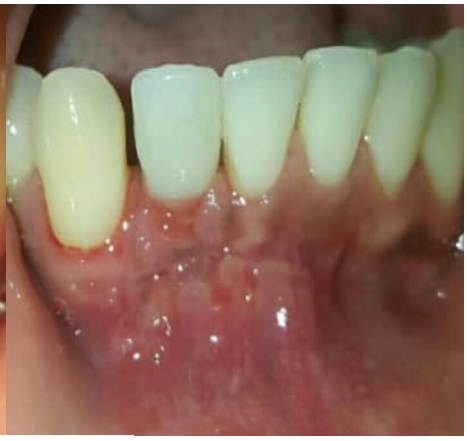


Fig. 17

On review after six months, there was significant bone regeneration in the apical region of the implant with a more favorable long-term prognosis (fig.18 and 19).

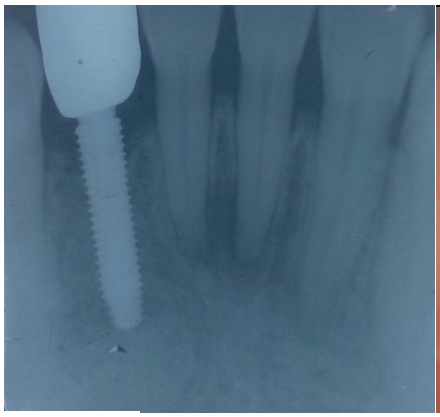


Fig. 18

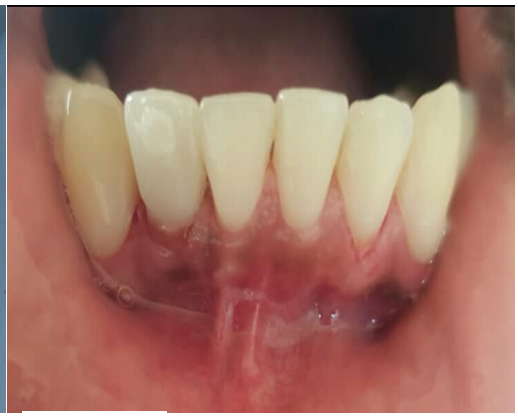


Fig. 19

The vitality of the neighboring teeth will continue to be monitored through periodic pulp vitality tests and radiological review.

DISCUSSION

While peri-implantitis (and the associated bone loss) commonly proceed in an orthograde pattern (marginal peri-implantitis), this case demonstrates the peculiarities of retrograde peri-implantitis.

Retrograde peri-implantitis also known, as apical peri-implantitis is the infectious inflammatory process of the tissues surrounding the implant apex that develops shortly after implant insertion while the coronal portion of the implant achieves a normal bone to implant interface.

There are different causative factors of apical implantitis, which may include contamination of the implant surface, over-heating of bone during drilling, over preparation of the implant bed and/or pre-existing bone disease.

In this particular case it is not immediately evident which of these factors may have contributed to the apical peri-implantitis, as there was minimal osteotome preparation, sufficient cooling of the implant drill throughout the drilling sequence and strict adherence to infection control protocols during and after placement of the implant. The presence of unresolved and undiagnosed pathology possibly as sequale to trauma in the periapical region of 42 and/or the neighboring teeth may have contributed to the formation of this lesion.

Results of histological examination of the lesion were largely equivocal but they indicated the presence of spindle shaped cells. The migration of such cells not ordinarily present in bone matrix may point to the existence of a chronic inflammatory process in the implant apical region.

CONCLUSION

Clinical and radiological review of the implant and endodontic evaluation of teeth adjacent to the implant site done periodically after implant placement is of utmost importance particularly where trauma is the cause of the tooth loss, as it assists in early identification of such lesions and timely establishment of appropriate treatment.

References

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