

Case Report

Management of Acute Hemorrhage in the Anterior Maxillary Region from an Aberrant Blood Vessel

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Article Information

Received: Mar 07, 2024

Accepted: April 02, 2024

Published: April 09, 2024

Archived: www.jclinmedsurgery.com

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Abstract

Implant placement for missing teeth has become a routine procedure to establish functional and aesthetics needs of the patient. And just like any surgical procedure, complications like bleeding, infection, etc can occur during implant placement as well. Bleeding from alveolar antral artery is one such complication which causes bleeding and any clinician should be prepared for its management. Authors have discussed one such case here and its management and that CBCT is a very important diagnostic tool which should be used for every case possible.

Keywords: Hemorrhage; Maxillary sinus; Alveolar Antral Artery; Arterial loop; Implants.

Introduction

Implant placement has become a common procedure when one has to rehabilitate missing teeth functionally and aesthetically. With better understanding and advances in technology there are many procedures available to rehabilitate maxillary arch and clinicians have many options of bypassing the sinus such as zygoma implants, all-on-4 technique, indirect sinus lift or graft less solutions and short implants. However, each aforementioned technique is not as predictable as direct sinus lift is specially in cases of severely atrophic maxilla [1,2]. Short implants have less bone-to-implant contact and have more chances of failure in load bearing areas. In a meta-analysis by Pappaspyridakos et al [3], authors stated that short implants (≤ 6 mm) have less predictable survival rates compared to longer implants (> 6 mm) after periods of 1-5 years in function. When it comes to indirect sinus lift, the procedure does not increase the height of maxillary sinus sufficiently [4], leaving direct sinus lift a predictable treatment choice. However, many patients are anxious in maxillary sinus grafting and the complications which follow the surgery, hence procedures like all-on-4 were developed which can rehabilitate the entire arch along with bypassing the sinus.

In order to do so, knowing anatomy and the arterial blood supply becomes paramount. Structure wise, Maxillary Sinus (MS) is pyramidal in shape and largest of the paranasal sinuses [5]. The anterior wall of the MS is formed by the facial surface of the maxilla. and is internally grooved by the canalis sinuosus (which houses the anterior superior alveolar nerve and vessels) [5]. It receives blood supply via maxillary artery and its branches. In this particular paper, the artery of interest is Alveolar Antral Artery (AAA) which is an anastomosis of the Posterior Superior Alveolar Artery (PSAA) and the Infraorbital Artery (IOA) [6]. As the name suggests it appears on the maxillary facial plate near to or in close approximation with maxillary second premolar and first molar area, a position from where it takes a U-turn, roughly paralleling the sinus floor. Not much has been reported regarding this artery in the literature as it goes undetected and the clinician only comes to know when it interferes during osteotomy (10-30% of cases) or any complication [7,8]. It has higher detection rates in males due to larger diameters, as well as in narrower maxillary sinuses < 14 mm in width. Immediate complication is bleeding, which can be called as the 'gateway complication' further leading to a series of complications impact treatment prognosis and outcome and or abortion

Citation: Mahesh L. Management of Acute Hemorrhage in the Anterior Maxillary Region from an Aberrant Blood Vessel. *J Clin Med Surgery.* 2024; 4(1): 1147.

of the surgical procedure [6,9]. Also the vertical distance of the artery from the alveolar ridge varies in patients depending upon the resorption of the ridge. Solar et al [10] reported a range of 15 - 25 mm of vertical positioning of the artery in alveolar bone in a mixed dentate/edentulous population. However a more reliable measurement would be the one done via CBCT, where ridge resorption will not influence the vertical distance had been found to be mean of 7.66 mm [11]. Park et al [12] found this height to be between 7.71 - 8.01 mm, and suggested a lateral window of 8mm for visualization, instrumentation and graft placement if sinus lift is to be performed. Studies have shown that the artery has an average diameter of 1.5 mm [13], and that a Diameters < 0.5 mm does not any significant bleeding to interfere with surgery [14]. But Testori et al [15] suggested that a small calibre vessel on CBCT, may correspond to a much larger calibre vessel clinically.

Case report

A 59-year-old male patient reported to the dental office with missing maxillary teeth due to poor oral hygiene. Treatment planning was done for all on four implant placement followed by prosthesis. A complete medical history was obtained and was negative for any significant medical problems. Patient denied being allergic to any medication as well. Patient agreed for the implant placement and was advised orthopantomogram (Figure 1). On the day of the surgery, before commencing the procedure under strict asepsis, patient was asked to rinse with 0.12% chlorhexidine gluconate mouthwash (Peridex; Proctor & Gamble, Cincinnati, OH). Local anaesthesia with a vasoconstrictor was infiltrated buccally and palatally into the posterior and anterior maxilla on both the sides and Using a S-blades (straight) (Zabby, India) incision was given on the crest of the ridge in the region of 15-25. While giving the incision, bleeding was noticed in the region of 15 which intensified during the flap reflection (Figure 2). Bleeding was pulsatile indicating arterial bleed. Initially to control pressure pack and ice pack was given, in the meantime the bleeder was isolated and the vessel was ligated (Figure 3). The bleeding could be controlled and the procedure was completed by placing 4 Bioner implants (Bioner, Spain) of size 4/10mm. Sutures were placed and patient was kept on basic medication for pain and infection control. Immediately after the surgery patient was advised for CBCT, as shown in the figure 4 a coronal view and 4b (yellow arrows) position of the artery can be seen.

In the follow-up sessions, patients was comfortable and did complain of mild swelling which subsided with 4-5 days. A post-op CBCT showed excellent recovery, bone width and proper implant placement (Figure 5).

Discussion

Encountering AAA complication during all-on-4 procedure in the region of 14,15 has not been reported so far, however literature reports bleeding complication from AAA during sinus lift procedures. Another complication that occurs is infection in about 3% of the cases in 1% of the cases loss of graft [16], and this usually happens after hematoma formation. In simple terms, larger the vessels more the bleeding will be. According to Ella et al [17] the risk involving AAA in osteotomies can be >10% whereas according to authors Chan & Wang [18] and Elian et al [8] it is 20%. Authors Jensen et al [19] have reported

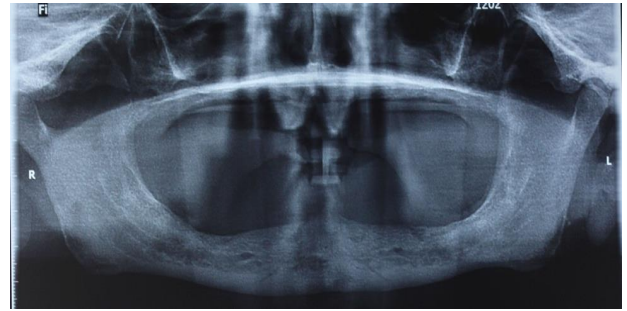


Figure 1: pre-op OPG.

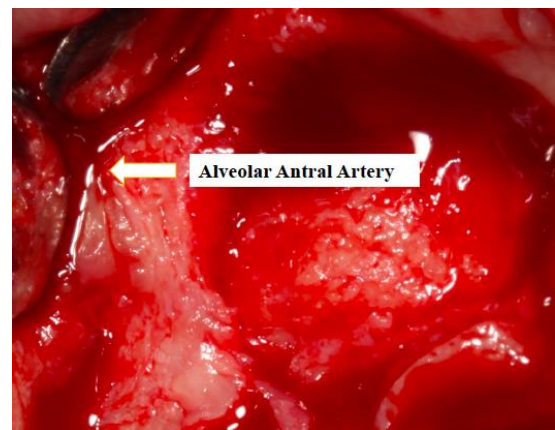


Figure 2: Alveolar Antral Artery.

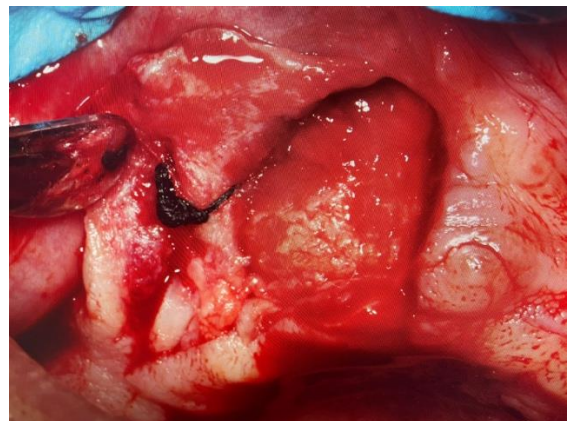


Figure 3: ligated artery.

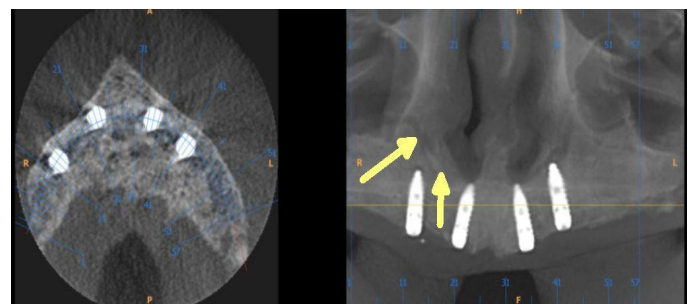


Figure 4a: CBCT post implant placement and position of the artery coronally. Figure 4b shows position of AAA in relation to implant placement (yellow arrows).

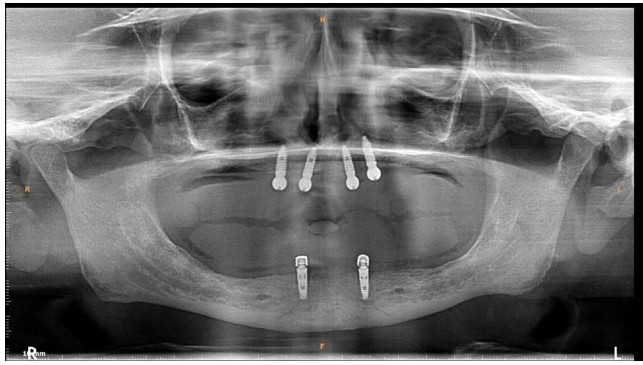


Figure 5: OPG after implant placement.

severe bleeding in sinus elevation surgery through transcrestal approach, where in, bleeding led to swelling and consecutive hospitalization for 3 days after which normal functioning was regained. Hence management of the complication plays an important part for the clinician.

The first and foremost is the application of pressure pack and ice pack to control the bleeding along with topical thrombin. Other products such as SURGICEL® Absorbable Hemostat, SURGICEL™ Powder (Surgicel; Johnson & Johnson Co., Somerville, NJ), Bone-wax can also be used. Usually because of bleeding at the surgical sight, pinpointing the exact bleeding spot becomes difficult but if that can be isolated then Electrocautery/chemo-cautery or ligation can be done. As aforementioned, if the vessel is large and bleeding cannot be controlled, the procedure should be aborted and patient should be hospitalised. Use of piezoelectric devices safely bypasses the vessels as it only cuts the bony surface, avoiding any chance of vessel rupture. The only disadvantage is that it is time-consuming method, but better when it comes to any complication or aborting the procedure. In a surgical double-window technique described by Mari-dati et al [20] osteotomy is made above and below the vessel leaving a thin bridge of bone holding the vessel intact. However this is a difficult technique to follow and does not work in terms of instrumentation, implant placement and septated sinuses [6]. The simplest of the methods to avoid this complication is detection which is best achieved with CBCT[®], however even with CBCT, AAA can be detected only in 50% of the cases [21,22], (may be because the vessel is too small to be detected by CBCT) which does not mean that there is an absent vessel or anastomosis does not exist, cadaveric studies have shown that anastomosis is present 100% of the time [23]. But it goes undetected or unreported, simply because many clinicians assume that the anastomosis does not exist or use basic radiographic techniques for the implant placement.

In the case discussed here, authors encountered a small vessel wherein the bleeding was easily controlled with pressure packs and ice packs. The site of implant placement is a safe zone and such bleeding complication usually occur during sinus lift procedures and not in the anterior region. A simple detection could have helped clinicians to plan osteotomy better, fortunately the vessel was not big the bleeding could be controlled by ligation, otherwise, may be the implant placement had to be postponed. This proves, CBCT is an excellent tool and should be used more often for the case planning and detection of pathologies [21].

Conclusion

Dental radiographs are an important tool in accurate diagnosis and treatment planning [21]. It is also the most common and important investigation carried out before any dental procedure which requires surgical or corrective intervention [21]. Thus, accuracy of the x-ray taken whether it is an Intraoral Peri-apical Radiograph (IOPA) or an Orthopantomogram (OPG) becomes paramount. However, these investigative tools provide a 2D image of a 3D object and are subject to false positive errors. Also, patients should be counselled and motivated for proper investigations. Above all, the surgeon must be competent to anticipate and effectively manage complications encountered during the surgery, as we could in the case discussed.

Acknowledgement: None.

Conflict of interest: None to declare.

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