SMART DENTAL UPDATES

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Dear Doctor,

Greetings from Micro Labs Limited. We are happy to bring you **"SMART DENTAL UPDATES"** which contain latest and interesting news in the field of Dentistry.

This issue contains:

- A cross-sectional study of the effects of mouth breathing on maxillofacial and airway development in children and adolescents at various cervical vertebral maturation stages.
- Randomized controlled clinical trial of computer-controlled intraligamentary local anaesthesia in the extraction of mandibular primary molars
- The implications of a deviated nasal septum and missing teeth on maxillary sinus volume.
- A case report on Internal maxillary artery pseudoaneurysm rupture in zygomaticomaxillary fracture

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Medical Team, Micro Labs Limited

A cross-sectional study of the effects of mouth breathing on maxillofacial and airway development in children and adolescents at various cervical vertebral maturation stages.

Introduction:

Chronic rhinitis, adenoid hypertrophy, palatine tonsils, and a deviated nasal septum are the most common causes of upper respiratory obstruction in children, forcing them to breathe through their mouths. According to studies, the prevalence of mouth breathing in children ranges from 17 to 50 percent. Abnormal mouth breathing patterns cause postero-inferior rotation of the mandible, resulting in a prolonged imbalance of oropharynx muscle activity. [1] Cranial and maxillofacial muscles undergo a series of adaptive changes that affect jaw growth and development and result in malocclusion. [2] The impact of mouth breathing on maxillofacial development is still unknown. The findings of a study on the effects of mouth breathing on the anterior lower height of the face and the position of the maxilla are presented. [3] The study's aim was to look into the effect of mouth breathing on maxillofacial and airway development in children and adolescents at various stages of cervical vertebral maturation.

Methods:

A total of 120 children and adolescents, 64 girls and 56 boys (7-15 years old), diagnosed with mouth breathing, had their lateral cephalometric radiographs examined. Manual and digital techniques were used to obtain measurements of maxillofacial hard tissue, soft tissue, and airways. The difference between the measured indexes and the standard values was compared using an independent samples t-test.

Results:

SNB (CS1-CS5), GoGn (CS1-CS5), ArGoNa (CS1-CS5), ArGo (CS1-CS2), and SNA (CS1-CS2) were all lower than the standard values in mouth breathing children and adolescents. NGoMe (CS1-CS5), SN-MP (CS1-CS4), SN-PP (CS1-CS4), PP-MP (CS1-CS3), and SN-GoGn (CS1-CS2) levels were higher in mouth breathing children and adolescents (P0.05). In terms of maxillofacial soft tissue measurements, H angle (CS1-CS5), lower lip length (CS1-CS5), upper lip protrusion (CS1-CS5), upper lip length (CS1-CS4), lower lip protrusion (CS1-CS3), surface Angle (CS2-CS3), and nasolabial angle (CS2) were all statistically significant. In terms of airway measurements, PAS (CS1, CS2, CS5) in mouth breathing children and adolescents was statistically significant above the standard value. (Fig.1)

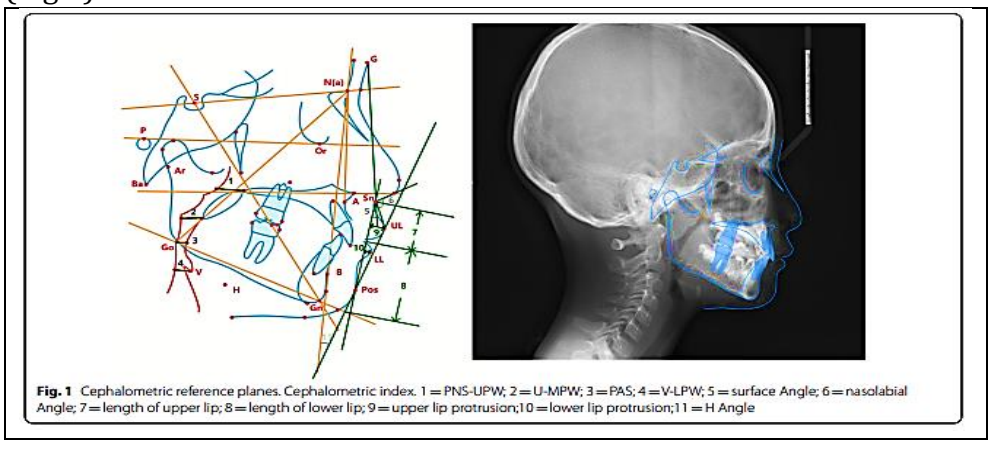

Fig. 1 Cephalometric reference planes. Cephalometric index. 1 = PNS-UPW; 2 = U-MPW; 3 = PAS; 4 = V-LPW; 5 = surface Angle; 6 = nasolabial Angle; 7 = length of upper lip; 8 = length of lower lip; 9 = upper lip protrusion; 10 = lower lip protrusion; 11 = H Angle

Discussion:

The review found that most studies on the effects of mouth breathing on craniofacial morphology and airway development in children used cross-sectional data. They used mouth breathing children of a certain age or multiple ages as research subjects. [4] Previous review articles suggested that there was a strong relationship between dental development and skeletal maturation, and that CVM was a reliable method for predicting the pubertal growth spurt. [5,6]

According to the cervical vertebral maturation method, included mouth breathing children and adolescents were classified into six stages (CS1-CS6) in this study. The cephalometric analysis discovered that maxillary protraction occurred during CS1 and CS2, and mandibular deficiency occurred throughout the entire stage from CS1 to CS5, as evidenced by underdevelopment of the mandible body and inferior-posterior rotation of the mandible. The inferior-posterior rotation of the maxilla was also observed in the CS1–CS4 stages. The first hypothesis of the study has been accepted. The maximum growth of the maxilla began at quantitative cervical maturity stage 1 (QCVM Stage I), but then slowed, whereas the maximum growth of the mandible began at quantitative cervical maturity stage 1.

In terms of airway development, the nasopharyngeal airway was significantly narrowed in female mouth breathing children and adolescents from CS1 to CS5. The nasopharyngeal and upper oropharyngeal airway narrowing in male mouth breathing children and adolescents, as well as the upper oropharyngeal airway narrowing in female mouth breathing children and adolescents, existed only before CS3. The third hypothesis was approved. The change in laryngopharynx airway in male mouth breathing children and adolescents had no statistical significance. Only in the CS1 period was the female mouth breathing children and adolescents' laryngopharynx airway lower than the standard value.

To summarise, the effect of mouth breathing on the maxilla and mandibular ramus in children and adolescents exists primarily during the early stages of growth and development. During the entire development of mouth breathing children and adolescents, shortening of mandibular body length and postero-inferior mandibular rotation were observed. Mouth breathing had an effect on upper lip protrusion, upper and lower lip lengthening, and retrogenia at all stages of growth and development. Longitudinal studies in different populations are suggested to investigate changes in hard tissue, soft tissue, and airway measurements between cervical vertebral maturation stages of mouth breathing children and adolescents.

Conclusion:

The effect of mouth breathing on the maxilla and mandibular ramus was most noticeable during the early stages of growth and development, whereas the effect on the lip could be felt throughout the entire growth and development stage. Females were more susceptible to oral-respiratory effects than males when it came to nasopharyngeal airway narrowing.

Mouth breathing had a significant impact on maxillofacial and airway development, which differed between mouth breathing children and adolescents with varying cervical vertebral maturation.he inflammation of the maxillary sinus is reduced three months after primary and secondary root canal treatments on maxillary premolars and molars.

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Randomized controlled clinical trial of computer-controlled intraligamentary local anaesthesia in the extraction of mandibular primary molars

Introduction:

Local anaesthesia (LA) is the foundation of pain management in dentistry. However, the injection poses a psychological risk, particularly in children, due to the fear associated with needle puncture, which may result in complete avoidance and refusal of treatment. Dental phobia accounts for 5-15 percent of the population. Injections are the source of the most anxiety. As a result, paediatric dentists are eagerly seeking less painful techniques. [1] Intraligamentary anaesthesia can be administered manually using standard or high-pressure syringes [2], or electronically using computer-controlled local anaesthetic delivery systems (CCLADS). [3] The Wand-STA (Single Tooth Anaesthesia) is the only CCLADS that includes dynamic pressure sensing (DPS) technology for real-time pressure monitoring. [4] The purpose of this study was to compare the pain experience of CC-ILA and conventional injection by IANB, as well as their effectiveness in controlling pain during mandibular primary molar extraction in paediatric patients. The null hypothesis stated that there would be no difference in pain experience between CC-ILA and IANB in paediatric patients.

Methods:

This randomised controlled clinical trial includes 50 healthy cooperative children aged 5-7 years with extracted mandibular primary molars. According to the LA technique, they were randomly assigned to two groups: the test group received CC-ILA and the control group received inferior alveolar nerve block (IANB). During injection and extraction, pain was measured physiologically using Heart rate (HR), subjectively using Face-Pain-Scale (FPS), and objectively using Sound-Eye-Motor scale (SEM). After 24 hours, patients were called back to record lip-biting events. Data was collected and analysed statistically. Administration of computer controlled Intraligamentary anaesthesia was in a multi-rooted tooth (fig 1.)

Results:

The study included 50 children (29 females and 21 males) with a mean age of 6.100.766. During injection, the CC-ILA group had significantly lower heart rate scores, but there was no significant difference between the two groups during extraction. During injection and extraction, the CC-ILA group had significantly lower SEM and FPS scores. After 24 hours, no children in the CC-ILA group reported lip-biting, compared to 32% in the IANB group.

Discussion:

The findings of this study rejected the null hypothesis that CC-ILA was less painful than IANB during injection. Although CCLADS has been shown to be effective, more research is needed to confirm its effectiveness in children with CC-ILA. [4] Most studies on CC-ILA compared it to maxillary buccal infiltrations [5], but the current study fills a knowledge

gap by being one of the few to compare CC-ILA and IANB in extraction of mandibular primary molars. The analysis of the collected data revealed that using CC-ILA in children resulted in significantly less pain during injection than IANB, as measured by HR, SEM, and FPS. This could be attributed to the needle's slow controlled flow rate, which causes minimal trauma to the tissues [6], lowering the child's pain threshold. As a result, it has the potential to eliminate the painful experience.

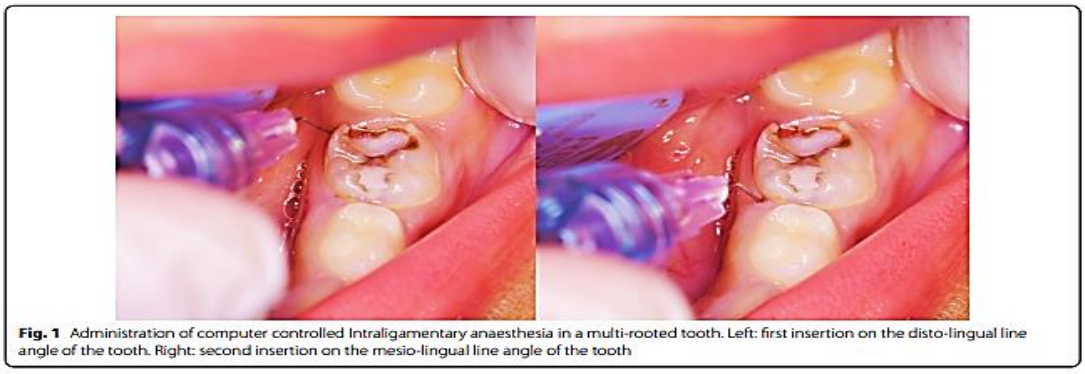

Fig. 1 Administration of computer controlled Intraligamentary anaesthesia in a multi-rooted tooth. Left: first insertion on the disto-lingual line angle of the tooth. Right: second insertion on the mesio-lingual line angle of the tooth

The findings are consistent with previous studies that found significantly lower mean HR using CC-ILA in the maxilla compared to conventional buccal infiltration. [7] There was a significant reduction in pain scores with CC-ILA. Mittal et al. compared CC-ILA to conventional ILA in primary mandibular and maxillary tooth extraction in 2019 and confirmed the same results using FPS and SEM [4].

Despite the fact that HR measurements revealed no significance, the FPS and SEM revealed significant differences between both groups during extraction. Instead of the pain stimulus itself, this could be justified by the child's behaviour. According to the findings of this study, CC-ILA demonstrated greater psychological acceptance by children than conventional syringes because the hand piece-designed syringe resembled a pen and the ultra-short needle was easily hidden in the dentist's hands, potentially reducing stress and fear during injection. Furthermore, children who received IANB experienced more pain during the injection, which had a negative impact on their behaviour. CC-ILA, on the other hand, provided a less painful experience that improved the child's psychological behaviour and overall satisfaction. One of the most striking findings in this study was that no participants in the CC-ILA group bit their lips or cheeks.

The use of CC-ILA combined the benefits of a potentially painless injection by using CCLADS, as well as the rapid onset of profound ILA achieved by delivering solution directly into the PDL of the target tooth.

Conclusion:

Based on the findings, it can be concluded that CC-ILA provides less painful injections than conventional IANB and is more widely accepted by paediatric patients. It eliminates lip/cheek biting events as well as the side effects of other conventional techniques.

CC-ILA injections are significantly less painful than traditional techniques and have been shown to be as effective as IANB during mandibular primary molar extraction. The complete absence of any lip/cheek biting events was a significant advantage of this technique.

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The implications of a deviated nasal septum and missing teeth on maxillary sinus volume.

Introduction:

The reason for tooth extraction and the projection of the tooth roots into the maxillary sinus is said to greatly reduce bone height from the alveolar ridge to the maxillary sinus floor, while missing teeth is said to cause the maxillary sinus to expand, both of which are important considerations during maxillary molar dental implant treatment. [1] As a result, patients frequently require maxillary sinus augmentation, which in a comprehensive evaluation was found to be extremely effective in 94.9-100 %, regardless of implant type. [2]

Methods:

Tooth extraction and root projection into the maxillary sinus have been shown to reduce bone height from the alveolar ridge to the maxillary sinus floor significantly, while missing teeth have been shown to cause the maxillary sinus to expand, all of which are important considerations during maxillary molar dental implant treatment. As a result, before proceeding with sinus augmentation, it is critical to examine the anatomical aspects of the maxillary sinus that may cause complications. We looked at how missing teeth and nasal septal deviation (NSD) affected maxillary sinus volume in three dimensions (MSV). Patients with two or more missing teeth and a maxillary sinus augmentation for a unilateral free-end saddle were chosen as participants. The MSV and NSD were determined using cone-beam computed tomography (CBCT). On a bilateral basis, the Wilcoxon t-test was used to compare the presence/absence of teeth and NSD with MSV in each patient. For each DICOM file, axial images were exported as a single frame with a 512512 matrix (Fig. 1)

Results:

This study included 30 patients (30 sinuses; 12 men, 18 women). The patients' average age was 58.210.12 years. On average, thirteen people had two missing teeth, while seventeen had three or more missing teeth.

NSD was discovered in nine people (30 percent). MSV was 21.503.84 cm3 on the ipsilateral and contralateral sides of the NSD, respectively, indicating that the NSD had no effect on MSV (p=0.150). The edentulous and non-edentulous sides' mean MSVwas 21.583.89 cm^3 and 21.774.30 cm^3, respectively, indicating that the MSV on the edentulous side was much less.

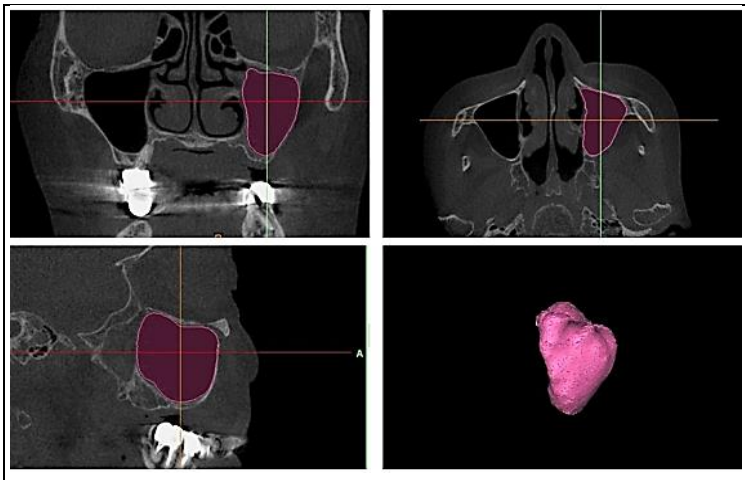

Fig 1. Method for measuring MSV. Upper-left: Visualization of the maxillary sinus in the coronal plane. Lower-left: Visualization of the maxillary sinus in the axial plane. Upper-right: Visualization of the maxillary sinus in the sagittal plane. Lower-right: Visualization of the maxillary sinus in three dimensions. MSV maxillary sinus volume

Discussion:

The maxillary sinus is a critical anatomical feature in maxillofacial surgery. There have been few reports on the effect of a deviated nasal septum, polyp formation in the maxillary sinus, the presence or absence of a septum, and the influence of bone head height on maxillary sinus volume because previous studies have primarily focused on the condition of the maxillary sinus floor in relation to maxillary implants. [3]

A bone and cartilage structure that divides the nasal cavity on both sides is known as the nasal septum. While a completely straight nasal septum is extremely uncommon, NSD is estimated to affect 20-79 percent of the population. The nasal septa of sinusitis patients were significantly deviated.

In contrast, due to the lack of stimulation of the maxillary bone, a study found that the volume of the maxillary sinus was lower in completely and partially edentulous individuals than in dentate patients. Individual patient MSV on the edentulous and non-edentulous sides was much lower when compared.

Despite the fact that the study compared MSV within each individual in unilateral partially edentulous people, the results were comparable to the current study. [4] The study evaluated variations in sinus volume due to tooth loss among the same participants in our study, which distinguished it from previous studies. As a result, we concluded that the decrease in sinus volume could not be explained by ageing.

The decline was caused by a lack of stimulation of the maxillary bone. Furthermore, although it was not a requirement for inclusion, the fact that all of the target patients had their teeth extracted within a year of each other may have influenced the study's findings. This was a pilot study that focused solely on preoperative CT for maxillary sinus augmentation.

Conclusion:

Using three-dimensional CBCT measurements of the maxillary sinuses in partially edentulous individuals, MSV was found to be unrelated to NSD but significantly reduced as a result of missing teeth.

Despite the fact that this was a small preoperative study, three-dimensional maxillary sinus assessment with CBCT in partially edentulous individuals revealed that missing teeth resulted in significant decreases in MSV but not in NSD.

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A case report on Internal maxillary artery pseudoaneurysm rupture in zygomaticomaxillary fracture

Introduction:

Pseudoaneurysm is a rare life-threatening complication that involves an arterial wall breach that allows blood to extravasate into neighbouring tissues [1]. A hematoma caused by arterial wall damage is replaced by fibrous walls, which expand as a result of the continuous pulsating pressure and form a pseudoaneurysm [2]. Because the wall of a pseudoaneurysm is weaker than that of a true aneurysm, they are more dangerous and more likely to rupture. Furthermore, the occurrence of pseudoaneurysms varies after trauma, implying that they are likely to go undetected during initial imaging examinations such as computed tomography (CT). Only a few cases of post-traumatic pseudoaneurysms affecting the internal maxillary artery after a facial bone fracture have been reported. The bleeding occurred postoperatively in these cases [3]. The study here reports a case of intractable epistaxis in a patient with a zygomaticomaxillary complex (ZMC) fracture that occurred just before open reduction and internal fixation (ORIF).

Case Report:

After an electric kickboard accident, a 53-year-old man with no significant medical history presented to the emergency department with a comminuted ZMC fracture. Sinus haemorrhage with posterior maxillary wall fractures was discovered during a clinical examination and non-contrast-enhanced CT images (Fig. 1). There was some epistaxis, but the bleeding stopped on its own after nasal packing. A week later, an ORIF to repair the ZMC fracture was scheduled. Common symptoms of pseudoaneurysms, such as pulsatile mass, neighbouring nerve compression symptoms, and typical systolic bruit, did not appear until the day of the planned surgery; however, the patient experienced uncontrolled epistaxis of unknown origin on this day. The patient's vital signs were stable; however, despite surgical sponge packing, the bleeding did not stop. The suspected active bleeding source was a posterior structure to the ZMC.

Contrast-enhanced CT images revealed damage to the posterior wall of the left maxillary sinus, as well as contrast agent leakage into the sinus. In the interventional radiology department, emergency angiography and endovascular embolization were performed because a pseudoaneurysm rupture was suspected. A ruptured pseudoaneurysm of the posterior superior alveolar artery, originating from the internal maxillary artery, was discovered (Fig. 2); consequently, the study used Concerto microcoil embolization (Fig. 3). The patient's vital signs were stable, and hemostasis was achieved. ORIF was successfully performed under general anaesthesia thirteen days after the endovascular procedure with no complications (Fig. 4).

Subciliary, gingivobuccal, and lateral brow approaches were used, with infraorbital rim, zygomaticomaxillary buttress, and frontozygomatic suture as points of fixation. The patient was pleased with the clinical outcome during a 2-month follow-up visit.

Discussion:

The internal maxillary artery is a complex and difficult structure to manage, with the largest and most terminal external carotid arterial branches supplying the deep facial

structure. Internal maxillary artery pseudoaneurysms can develop as a result of trauma or infection during maxillofacial surgery. Delayed pseudoaneurysms occurred after fracture reduction or orthognathic surgery in previously reported cases. In the current case, however, bleeding was discovered just before performing an ORIF for a ZMC fracture in a patient who had no symptoms of a pseudoaneurysm. When the blood vessel walls are partially ruptured and the blood flow between the arterial laceration and hematoma is maintained, a post-traumatic pseudoaneurysm forms. As the leakage continues, the hematoma expands, resulting in a pseudoaneurysm.

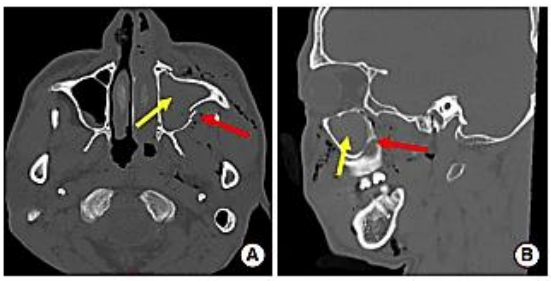

Fig. 1. Preoperative computed tomography images show the location of left zygomaticomaxillary complex fracture (red arrow) and hemorrhage area (yellow arrow). (A) Axial image. (B) Sagittal image.

Fig. 2. Contrast-enhanced computed tomography images show the location of the pseudoaneurysm in the branches of the left internal maxillary artery with sinus hemorrhage (red arrow). (A) Axial image. (B) Sagittal image.

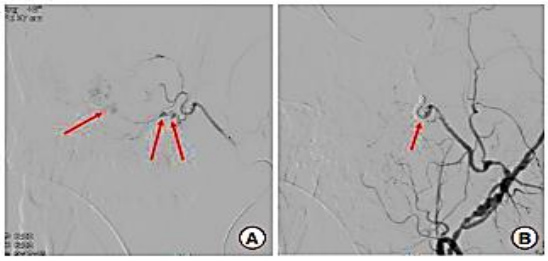

Fig. 3. Angiographic images. (A) Total of three pseudoaneurysms of the posterior superior alveolar artery (red arrows). A branch of the internal maxillary artery is identified as the bleeding feeder. (B) Through coiling, endovascular embolization of the proximal and distal part of posterior superior alveolar artery was performed, and there was no residual bleeding as soon as the pseudoaneurysms disappeared.

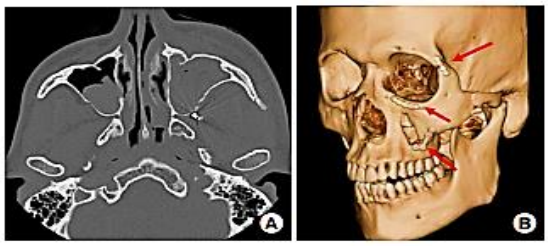

Fig. 4. Computed tomography images show the successful repair of the left zygomaticomaxillary complex fracture using open reduction and internal fixation surgery. (A) Axial image. (B) Three-dimensional image presenting location of three-point fixation (red arrows).

Patients with an internal maxillary artery pseudoaneurysm may experience swelling, facial paralysis, bruit, and an expanding mass [4]. However, upon arrival at the emergency department, there were no symptoms of a pseudoaneurysm (other than mild epistaxis). On the day the ORIF was planned, the patient experienced uncontrollable epistaxis. A pseudoaneurysm was diagnosed using contrast-enhanced CT and angiography, and selective endovascular embolization was used as an effective treatment. If the patient had been discharged without exhibiting any symptoms of a pseudoaneurysm, the consequences of unexpected massive bleeding would have been fatal.

Facial pseudoaneurysms, in particular, typically form within days to weeks of blunt trauma [3]. Due to a gradual weakening of the arterial wall and erosion of adjacent bones, the latent period can range from several days to several years, with most pseudoaneurysms arising within 3 weeks (88 percent) of the trauma. As a result, predicting the occurrence of pseudoaneurysms may be difficult due to the wide variation in symptom presentation. It was an event that occurred one week after the trauma in the current case.

In the current case, the posterior wall of the maxillary sinus was damaged, resulting in the formation of a pseudoaneurysm in the maxillary sinus. Initially, only mild epistaxis (which is common in cases of facial fractures) was observed, with no other specific findings. As a result, only reduction surgery for the fracture was planned, with no additional diagnosis or treatment for the epistaxis. Although post-traumatic pseudoaneurysms of the internal maxillary artery and its branches are uncommon, they can be fatal; therefore, prompt diagnosis and treatment are critical. Direct compression, tissue removal, and embolization with selective angiography using contrast agents are all treatment options for pseudoaneurysms. In the current case, the patient underwent a radiological intervention to treat the pseudoaneurysm, followed by an ORIF to repair the ZMC fracture

Conclusion:

Finally, in patients with posterior maxillary wall fractures, the risk of uncontrolled bleeding caused by pseudoaneurysms should be considered during the perioperative period.

This case illustrates that there is a risk of uncontrolled bleeding in the perioperative period in patients with a posterior maxillary wall fracture, which could be caused by pseudoaneurysms and should be considered even in the absence of typical symptoms.

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