

Re: Maxillary Artery Pseudoaneurysm as a Complication of Maxillofacial Injuries

Report of three cases and literature review

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Dear Editor,

We read with interest the case report by Al Saadi *et al.* published in November 2019 issue of *SQUMJ* and would like to commend the authors for their efforts in highlighting three examples of maxillary artery pseudoaneurysm.¹ As indicated in their article it is a rare but devastating complication that could occur from maxillofacial trauma or its management. However, there were some points that we would like to discuss when attempting to understand the relationship between maxillofacial trauma and pseudoaneurysms of the vascular supply in the head and neck.

There is usually a dilemma of what actually causes the pseudoaneurysm in the first place in the setting of maxillofacial trauma that undergoes a surgical intervention. Is it the initial injury or the surgery? It is difficult to definitively delineate the exact cause without pre-operative vascular imaging assessment such as a computed tomography-angiogram (CTA) or a conventional angiogram. In other words, in order to assume that the initial injury caused the pseudoaneurysm rather than manipulation during surgery, a detailed pre-operative vascular assessment is required. In the cases presented in the article, there is no evidence of pre-operative imaging provided for any of the cases and therefore pre-existing vascular injury cannot be excluded. Therefore, one cannot assume that the subsequent development of pseudoaneurysm is secondary to the initial injury. It could also be iatrogenic and caused by surgical manipulation or at least masked by the surgery itself. Surgical manipulation during maxillofacial trauma management could cause vascular injury by impacting sharp bony edges or excessive traction of already traumatised vessels. Therefore, surgical intervention is a known and reported cause of vascular injury in maxillofacial trauma.^{2,3}

Some might argue that case two had evidence of mature arterio-venous fistula (AVF) during their digital subtraction angiography assessment which accounts for the chronicity of the pseudoaneurysm and therefore likely formed from the time of injury. However, acute arteriovenous fistulas has been reported in the literature and could be caused by surgical manipulation that usually leads to vessel trauma and haemorrhage.⁴⁻⁶ The question remains whether it even matters what caused the pseudoaneurysm, whether it is the initial trauma or the surgical trauma.

We would argue that it is critical to be specific about the cause of rare but potentially devastating complications. Understanding the root cause could lead to improvement in surgical techniques in order to design safe approaches. For example, investigating high risk cases with vascular imaging prior to operative management would guide surgical management and potentially avoid devastating complications. In the case of subacute bilateral displaced condylar fractures, CTA is arguably indicated. If a pseudoaneurysm is detected, then neoadjuvant endovascular intervention to address the pseudoaneurysm is warranted prior to embarking on a surgical intervention; this may avert a potential complication. Furthermore, it is important to highlight any rare but potentially devastating complications during the consent discussion with the patient particularly in high risk situations where surgical manipulation could traumatise an otherwise asymptomatic pseudoaneurysm. Moreover, for the legal protection of healthcare providers, the severity of the injury and its associated complications should be delineated to avoid litigation arising from a complication that occurs from the trauma rather than the surgery.

The article would have been strongly supplemented if the authors had provided some pre-operative vascular assessment. While we appreciate that not all cases might have pre-operative vascular assessment, the fact that case two had a previous AVF and embolisation procedure suggests that a pre-surgical vascular imaging could have been done and possibly the maxillary pseudoaneurysm would have been identified and managed appropriately with endovascular intervention.

We advocate for vascular imaging to be considered as an initial step if there is high clinical suspicion for possible vascular injury based on mechanism of trauma or other identified injuries such as basal skull and cranial fractures, high condylar, midfacial, pan facial fractures and associated vascular injuries.^{2,7} We do recognise that this approach might not be practical in cases of acute life threatening haemorrhage, however, most facial and cranial fractures can be treated sub-acutely once life-threatening issues have been adequately addressed. Therefore, pre-operative vascular imaging in the form of a CTA is appropriately indicated in all patients with severe blunt facial and neck trauma. There is growing literature in the field of trauma that indicates that blunt neck and facial trauma is associated with high rate of vascular injuries such as vertebral artery dissection and CTA are indicated.^{8,9}

In summary, it is difficult to assess the exact cause of symptomatic vascular pseudoaneurysm in maxillofacial trauma especially if vascular imaging is not conducted pre-operatively. It is possible that the initial trauma or the surgery could cause the pseudoaneurysm and delineating the exact cause is critical. It is also likely that surgical manipulation could cause an otherwise asymptomatic vascular injury to develop into a devastating haemorrhaging pseudoaneurysm. Hence, we recommend considering vascular imaging such as CTA or conventional angiogram in high risk patients.

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Response from the Authors

Dear Reader,

We appreciate the interest in our article describing maxillary artery pseudoaneurysm as a complication of maxillofacial injuries.¹ Our primary goal was to emphasise the importance of keeping a high level of suspicion should an intra-operative brisk bleeding be encountered while operating in the field of this artery in an otherwise asymptomatic trauma patient. The clinical presentation, diagnosis and management of this complication were highlighted with a brief literature review in an attempt to provide more information on the topic including the relationship between trauma and pseudoaneurysm formation.¹

We agree that there could be a dilemma in the exact cause of the pseudoaneurysm. Nonetheless, as the formation of pseudoaneurysm usually takes time and as all our presented cases were sent for CTA and embolisation immediately after the operation, the pseudoaneurysm is more likely to have formed at the time of trauma rather than during surgery; the surgical manipulation is more likely to have caused the disruption of the pseudoaneurysm

and bleeding.¹ However, this can not be proven unless pre-operative imaging is done. In our second reported case, the AVF was diagnosed and managed immediately after trauma before any surgical intervention, thus the AVF could not have been iatrogenic.

As it was correctly mentioned, this complication is rare. On the other hand, maxillofacial injuries are common.^{1,2} Moreover, condylar process fracture is one of the most common mandibular fractures and could represent up to 50% of all mandibular fractures with low reported vascular complications even with surgical management.²⁻⁴ It is clear that maxillary pseudoaneurysms are problematic if they rupture leading to bleeding and further complications. Otherwise, the location of the maxillary artery may tamponade the pseudoaneurysm initially, while spontaneous thrombosis of 90% of the aneurysmal sac naturally occurs in 5–90 days, even in larger vessels such as the femoral artery.^{1,5} Thus, the risk of exposing such cases to CTA versus the benefit of detecting this rare finding is a highly arguable indication; not only does CTA pose an additional high radiation dose with other potential complications, it also poses an additional burden on the healthcare system.

In our institutions pre-operative CTA is a routine protocol for trauma patients who are symptomatic or highly suspected of having a vascular injury. As all our presented cases were asymptomatic and were scheduled for elective surgery there was no clear indication for a pre-operative vascular assessment. In addition, as these complications are rare or uncommon, a unified protocol is not possible to be applied to all cases; a situation-based decision is more appropriate. Moreover, a high-risk consent is usually a case-based decision depending on the severity of the injury.

In conclusion, maxillary artery pseudoaneurysm is a rare complication of maxillofacial trauma. Vascular assessment with CTA should only be performed when clinically indicated. Surgeon awareness of the possibility of such an unusual complication while operating, in an otherwise asymptomatic patient, is crucial for successful management.

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