

Case Report: Delayed onset of severe acute facial swelling following bimaxillary osteotomy surgery

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ABSTRACT

This case report will discuss a 20-year-old male who presented to the Accident and Emergency (A&E) department at a district general hospital (DGH) with severe bilateral submandibular facial swelling four days following bimaxillary osteotomy surgery to correct his mandibular prognathism and maxillary retrognathism.

The patient had previously undergone both bilateral sagittal split (BSSO) and LeFort 1 osteotomy surgery for the correction of a severe class 3 skeletal discrepancy following orthodontic treatment. The osteotomy was stabilised with titanium fixation plates. Following the surgical treatment, the patient received a regime of co-amoxiclav antibiotic prophylaxis and dexamethasone to combat post-operative inflammation. After an uneventful surgery and a single night in hospital post-operative inpatient stay, the patient was discharged with oral antibiotics and chlorhexidine mouth rinse along with their regular inhalers for his medical history including mild well controlled asthma.

Four days following the surgery, the patient presented to A&E complaining of sudden onset severe dysphagia, trismus, and bilateral submandibular and submental facial swelling, only noticed on waking. This case report will discuss the indications of a bimaxillary osteotomy as well as the management and treatment of post-operative complications following this surgery.

INTRODUCTION

A bimaxillary osteotomy allows for the repositioning of the maxilla and mandible to improve a patient's function and aesthetics.¹ Indications for this procedure include: to correct skeletal deformation, improve function/biting, relieve pain often associated with traumatic bites, temporomandibular joint dysfunction (TMJ/PDS) or alteration of appearance,¹ and in the treatment of obstructive sleep apnoea and snoring.

This case report encompasses a young patient undergoing this physically transforming procedure to improve the functional component of his lifestyle. This treatment combines the surgical skills of an oral and maxillofacial (OMFS) surgeon with the precision and planning of an orthodontist to ensure an ideal outcome.

Any surgical procedure carries post-operative risks. It is important that patients are made aware of this to allow for informed consent² prior to commencing the procedure. Risks specific to this procedure include the possibility of permanent paraesthesia to the lip, tongue and cheek due to involvement of the inferior alveolar dental nerve (IDN), lingual nerve and long buccal nerve, respectively. Less commonly, paraesthesia to the infraorbital region is noted due to involvement of the infraorbital nerve, but this is usually temporary, and the sensation to the upper lip/cheek/lateral nose/lower lid, invariably makes a full recovery.

Most commonly haemorrhage risk is described as an intraoperative complication involving the inferior alveolar,

superior alveolar, maxillary, retromandibular, facial, and sublingual vessels.

The initial procedure was carried out under general anaesthetic with nasotracheal intubation, after the patient received pre-operative doses of prophylactic intravenous (IV) co-amoxiclav and dexamethasone. Doses were continued post-operatively every eight hours until discharge the following day. LeFort 1 and bilateral sagittal split osteotomies were conducted and secured with titanium fixation plates. Attempts were made to secure the left osteotomy with bi-cortical fixation screws, however this was not completed, and mono-cortical mini-plates were used bilaterally, to fix the mandible securely.

METHODS

On arrival to the A&E department, routine blood results were obtained to indicate a normal white blood cell (WBC) count and elevated C-reactive protein (CRP). On clinical examination, the bilateral swelling in the sublingual and submental regions were firm to palpation, slightly tender and mouth opening was limited to 5-8mm. He had voice changes with the classical description of a 'hot potato' voice, signifying considerable swelling/.oedema of the soft palate.

An anaesthetic review reported an unremarkable respiratory rate with no evidence of dyspnoea, wheezing or stridor at this current time.

RESULTS

A head and neck computerised tomography (CT) scan with contrast was ordered urgently along with radiologist report. The scan indicated a left submandibular radiolucency and evidence of displacement of the hypopharynx towards the patient's right-hand side (see figure 1).

MANAGEMENT

Emergency surgery was arranged to immediately explore the fascial spaces involved. This also allowed placement of both extra and intra-oral drains. Conscious fibre-optic nasotracheal intubation was performed to manage the patient's airway prior to surgery. The operation involved exploration of both the left submandibular and submental spaces along with the left pterygo-mandibular and buccal space for haematoma evacuation. Following drain stabilisation, the patient was transferred to the intensive therapy unit (ITU) and an anaesthetic decision was made to leave the patient intubated overnight. IV co-amoxiclav and dexamethasone were continued over this period.

The patient remained intubated for a further two days under sedation before sufficient improvement was noted by the anaesthetics team to allow for safe extubation. Drains were removed the following day after the patient showed further improvement. Significant discharge was collected following drain placement. Two days post extubation, the patient was discharged to continue their recovery at home, with out-patient follow up organised in due course.

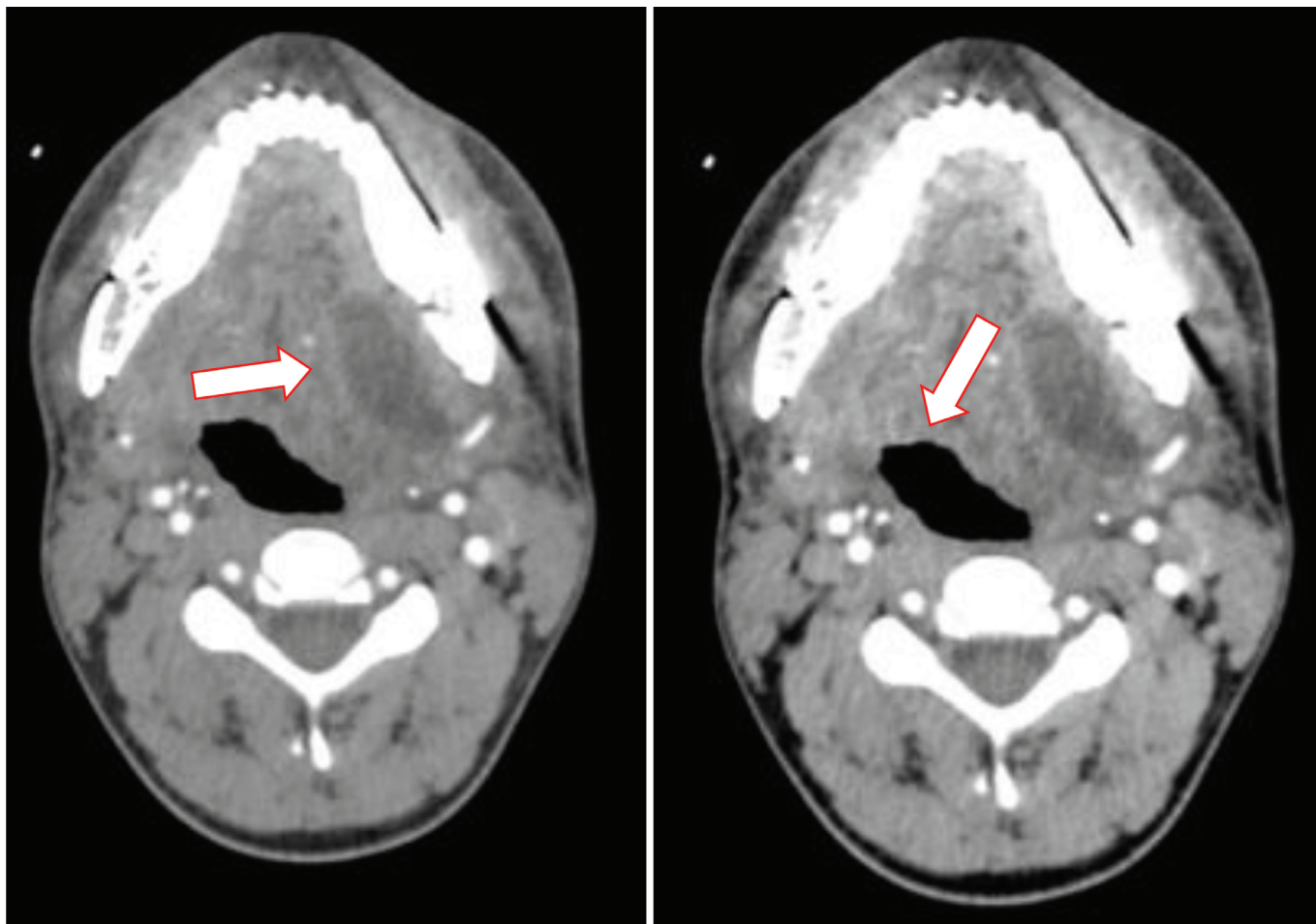


Figure 1: CT indicating the displacement of the hypopharynx due to the large evolving haematoma in the left pterygo-mandibular space.

Follow up at two weeks was most encouraging. The patient had no new complaints and was managing their recovery well at home. Mouth opening was much improved, and the swelling had reduced considerably. The extra-oral incision left on open drainage was decreasing in discharge and showed no signs of infection. There was no facial weakness, however some paraesthesia of the left side of the tongue was reported. The initial bimaxillary osteotomy had achieved the desired outcome with satisfactory class I occlusion. The patient was advised to remain on a soft diet for a further month and attend further review at that point.

DISCUSSION

Bimaxillary osteotomies have been associated with an increased risk of post-operative complications when compared to the Le Fort 1 osteotomy or BSSO independently.³ This is not surprising when both procedures are being carried out together, simultaneously carrying the risk of each individual procedure. Conversely, patients requiring both mandibular retrusion and maxillary advancement benefit from only having to undergo a single general anaesthetic (and associated risks) and endure a single recovery period. The same paper also highlighted that patients ASA 3 and above had significantly higher risk of post-operative complications. The patient described in this case was ASA 2 and was not in this category.

ID nerve injury has been quoted as the single most common complication and as high as 50%, followed by haemorrhage at 9% and infection at 7%.⁴ Some form of long term sensory deficit are reported between 10 and 30%.⁵ Interestingly haemorrhage is most commonly described as an intra-operative complication most commonly associated with the inferior alveolar, superior alveolar, maxillary, retromandibular, facial, and sublingual vessels.⁶

A similar case in the literature can be found described by Bertossi et al,⁷ however in this case the patient developed neck swelling and dyspnoea within one day post-operatively. CT scans in this case share similarities with the case described above including displacement of the hypopharynx, however due to collections in different fascial spaces. Angiography in this case indicated bleeding from palatine branches of the left ascending pharyngeal artery and a collection in the left parapharyngeal space. It is possible this case has similar aetiology and presentation due to collections in different facial spaces. Angiography was not carried out in the case described above, therefore it is difficult to know which vessels were responsible aside from the location of the collection identified on the CT. The difference in time to presentation post operatively may indicate a small vein was the offending vessel and not an artery.

Studies regarding post-operative airway management exist looking into possible airway complications following such

surgery. Meisami et al⁸ carried out post-operative magnetic resonance imaging (MRI) assessment of 40 patients' airways following orthognathic surgery. MRI imaging was conducted at 24 and 48 hours postoperatively. Whilst marked oedema and swelling was found around the lips and cheeks, no airway compromise was identified in the 40 patients within this study. Out of the 40 patients in this study 25 did receive bimaxillary surgery of both upper and lower arches. This study differs from the case above by the fact that assessment only went up to 48 hours potentially failing to include more delayed cases.

Politis et al⁹ conducted a retrospective study over 23 years from 1989 to 2012 on the postoperative airway complications following orthognathic surgery. Out of 2164 patients included, only two required re-intubation following airway compromise. Both these patients had received a BSSO. In both cases the airway compromise was seen within four hours postoperatively. Again this differs from the case above where onset was delayed by four days. Within this study there were numerous cases of airway distress where intermaxillary fixation (IMF) was released and was sufficient in airway management.

There is evidence that the movement of the mandible via orthognathic surgery can have an effect on the pharyngeal airway space. One study including 25 males found that set back procedures were associated with reduced airway volume when comparing pre and post-operative CT scans;¹⁰ all patients in the study received both BSSO and LeFort 1 osteotomy. In contrast mandibular advancement surgery was associated with increased pharyngeal airway volume. This would indicate that the physical skeletal movement with mandibular setback surgery will impact on the airway, hence sleep apnoea is a potential risk for patients undergoing such surgery.

An interesting case found in the literature reported on a patient who underwent orthognathic surgery with undiagnosed angioedema. With operative trauma being a significant risk of triggering an attack, the surgery resulted in severe airway compromise. Extubation in this case was delayed for 24 hours after a positive response to treatment to ensure the airway was maintained and secure.¹¹

An interesting question raised in this case is on the use of pharmacological methods to manage haemorrhage intraoperatively and post-operatively. Intraoperative IV tranexamic acid has been shown to decrease haemorrhage intraoperatively however no significant difference has been found on the rates of post-operative complications, length of hospital stays or wound drainage volumes.¹² Tranexamic acid irrigation has also been discussed and studied in the literature and has been shown to reduce intraoperative blood loss.¹³

The patient described in the case above was provided with IV dexamethasone preoperatively and eight hourly post-operatively until discharged the following day. Steroids are well cited in the literature to reduce post-operative swelling, oedema and improve the overall recovery time for patients undergoing all forms of orthognathic surgery.¹⁴ Unfortunately, there is little evidence that they can help to reduce neurosensory disturbances following this surgery.

The patient was placed on IV co-amoxiclav post-operatively and discharged on oral antibiotics. On admission with the complication described above, the patient remained on IV co-amoxiclav for the duration of their stay. A Cochrane review in 2015¹⁵ found good evidence to support long term antibiotic prophylaxis as opposed to single doses in the

prevention of surgical site infection following orthognathic surgery. Little evidence was found to advocate any individual regime. Post-operatively the patient was left with open incisions and drains in situ, additionally the patient was at increased risk of infection whilst mechanically ventilated through nasotracheal intubation.¹⁶ Antibiotic cover throughout this period likely provided a great deal of benefit to the patient's recovery.

Bi-cortical screws and titanium plates are both widely cited in the literature as the two methods of fixation. Bi-cortical screws benefit from providing the highest level of initial mechanical strength due to immediate engagement in both mandibular cortical plates.¹⁷ Titanium miniplates however will not provide this level of initial stability, as they engage the buccal cortex only, but benefit from allowing small amounts of adjustment that can help allow the occlusion to settle when guided with intermaxillary elastics. Bi-cortical screw preparation requires depth control via tactile feedback alone when the drill is advanced from buccal cortex, through the trabecular bone and into the lingual cortex.¹⁸ Mono-cortical drills benefit from depth control stops (shoulders built into drills to restrict further bone penetration) at desired depths, most commonly 6mm and 8mm. Bi-cortical drills used from a transbuccal approach do not benefit from this and rely solely on operator skill. This is to allow them to pass through the transbuccal drill guide. This may place structures lingual to the mandible at increased risk when compared to fixation with plates and mono-cortical screws hence drill speed should also be reduced from 40,000 rpm to 10,000 rpm decreasing the risk of lingual soft tissue damage.

CONCLUSION

Complications of orthognathic surgery are well cited in the current literature, therefore a rigorous consenting process must be followed prior to the performance of any such elective surgery. The team responsible for carrying out such surgery should have a good understanding of possible complications and their management when operating in such a complex area of the body.

This case report highlights a less commonly discussed and potentially life-threatening complication that all surgeons should be ready to manage. The swift and robust action taken both by the anaesthetics and surgical team ensured that this case was managed safely to ensure a positive outcome for the patient.

It is important for clinicians to understand the impromptu importance of managing the various anatomical spaces in the head and neck region, to quickly identify if a patient requires emergency surgical input. In addition, the importance of early involvement of colleagues from various specialities optimises patient care and safe discharge home.

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REFERENCES

(a full list available on request)