Case report

In-hospital surgical treatment for haemorrhage after aesthetic mandibular osteotomy performed as an office-based day surgery: A case report

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\textbf{ABSTRACT}

In East Asia, a square face is considered unattractive, and mandibular contouring surgery is commonly used to give a smooth contour to the lower jaw. Mandibular contouring surgery occasionally involves not only osteotomy of the mandibular angle but also resection of the masseter muscle via an intraoral approach. This type of mandibular contouring surgery poses a risk of injury to the premasseteric branch of the facial artery and massive haemorrhage.

Here we report a patient who presented to our hospital with severe haemorrhage, swelling and airway constriction after bilateral mandibular angle and plane osteotomy with resection of the masseter muscle performed elsewhere as an office-based day surgery. The swelling and haemorrhage were treated successfully with emergency bilateral ligation of the facial artery and vein under general anaesthesia.

We concluded that the haemorrhage was caused by rupture of the premasseteric branch of the facial artery during the resection of the masseter muscle in a day surgery.

1. Introduction

The demand for facial cosmetic surgery continues to grow, particularly in East Asia. In this region, a square face is considered unattractive because it gives the impression of a strong and stubborn personality. Angle resection, corticectomy and tubercle excisions are the most commonly used methods of mandibuloplasty[1]. Since its introduction by Beak et al. in 1989, resection to correct prominent mandibular angles has become a common surgical procedure, particularly in East Asia[2,3]. There are several variations of cosmetic mandibular contouring surgery, including mandibular angle reduction, mandibular plane reduction, outer corticectomy and combinations[4,5]. These procedures often include not only osteotomy of the mandibular angle but also resection of the masseter muscle via an intraoral approach[6]. Some modifications of aesthetic mandibular contouring surgery have also been reported[7,8]; taken together, the procedure is becoming complex.

Complex mandibular contouring surgery may have an increased rate of surgical complications, such as post-operative haemorrhage and nerve injury. Although mandibular contouring osteotomy undoubtedly reduces the protrusion of the mandibular angle, patients must be made aware of the potential risks of this cosmetic procedure, particularly massive bleeding and swelling.

Despite many risks[9], this procedure is often performed as an office-based day surgery. Recent research showed that office-based procedures (surgical and non-surgical) doubled to approximately 10 million surgeries per year between 1995 and 2005[10]. The safety of an office-based day surgery is still debatable. However, complex surgery can cause severe complications, such as airway constriction and massive haemorrhage, and should be avoided. Here we report a rare case of airway constriction and massive post-operative haemorrhage caused by the rupture of the premasseteric branch of the facial artery after mandibular contouring surgery. We also discuss the possibility of serious post-operative surgical complications of this procedure and the risks associated with an office-based day surgery. This case report complies with the SCARE criteria[11].

2. Presentation of case

A 22-year-old man who was dissatisfied with his appearance, particularly mandibular angle protrusion, underwent bilateral mandibular angle and plane osteotomy with resection of the masseter muscle under general anaesthesia. The procedure was performed by an experienced plastic surgeon as an office-based day surgery at another facility. This

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was the first cosmetic surgery for the patient. He was transferred to our hospital with a complaint of difficulty in breathing 10 hours after the surgery. His lower face was swollen, particularly on the left side (Fig. 1A), and mouth opening was limited to 13 mm. The soft palate and middle pharyngeal area were also swollen. Computed tomography (CT) revealed a severely constricted airway (Fig. 1B), evidence of bilateral mandibular angle and mandibular plane osteotomy (Fig. 1C) and features indicating continuous haemorrhage from the surgical site.

We performed intraoral haemostasis at the surgical site via transnasal intubation with a fiberscope under general anaesthesia. We found large blood clots and continuous haemorrhage and noted a dissected left mental nerve at the mandibular contouring site. We could not confirm the source of the bleeding, but haemostasis was temporarily achieved via electrocoagulation and the application of oxidised regenerated cellulose (Surgicel®; Ethicon, Somerville, NJ).

Intubation was continued for 3 days after our initial intervention under sedation at the high care unit in our hospital, with monitoring of haemorrhage, swelling and wound compression. Three days later, the patient developed bilateral swelling extending from the parietal to the supravacular area. His haemoglobin levels decreased from 14.5 g/dL to 10.9 g/dL on day 1, raising the suspicion of on-going bleeding. CT angiography revealed a narrowed airway (Fig. 2A), and rupture of the premasseteric branch of the facial artery near the mandible angle was suspected (Fig. 2B) but not confirmed. Haemostasis was achieved with bilateral electrocoagulation and ligation of the facial artery and vein using tracheotomy via an extraoral approach.

The patient's swelling gradually resolved after ligature surgery and haemostasis. The sutures were removed on post-operative day 10. After we observed improvement of the laryngeal oedema via nasopharyngolaryngoscope, we removed the tracheostomy and nasogastric tubes on post-operative day 10. The patient was discharged on post-operative day 14. We followed up with the patient 3 days after discharge (post-operative day 17). At the next follow-up (post-operative day 30), mouth opening had increased to 41 mm, and the swelling had disappeared (Fig. 3). The patient reported satisfaction with our treatment. After we observed improvement of the laryngeal oedema via nasopharyngolaryngoscope, we removed the tracheostomy and nasogastric tubes on post-operative day 10. The patient was discharged on post-operative day 14. We followed up with the patient 3 days after discharge (post-operative day 17). At the next follow-up (post-operative day 30), mouth opening had increased to 41 mm, and the swelling had disappeared (Fig. 3). The patient reported satisfaction with our treatment. We could not complete a longer-term follow-up owing to the patient's unexpected cancellation of a subsequent appointment.

3. Discussion

Mandibular angle osteotomy with an oscillating saw via an intraoral approach is a standard procedure to which a number of modifications and improvements have been made [4,5,7,8]. An extraoral approach leaves an external scar and risks damaging the marginal mandibular branch of the facial nerve. A previous report suggested that although the intraoral approach provides relatively satisfactory results, there is a small risk of complications, including transient facial nerve injury,
mental nerve injury and massive bleeding, when the angles are resected [9].

Kang et al. [1] reviewed the incidence of complications in 588 Korean patients who underwent mandibuloplasty and reported that sensory deficit occurred in 38 patients (6.46%), infection in 19 patients (3.23%) and intraoperative bleeding requiring transfusion in one patient. They also described the risk of facial artery tearing during dissection or osteotomy of the mandibular margin.

The facial artery and vein cross the lower margin of the jaw just in front of the anterior border of the masseter muscle and temporomaxillary vein. Our case emphasises the potential risks of post-operative haemorrhage as a surgical complication, and surgeons must be attentive to the facial artery and vein and ligate them in case of bleeding when using the intraoral approach for mandibular angle osteotomy.

Depending on the complexity of the surgical method, mandibular contouring surgery occasionally includes not only ostectomy of the mandibular angle but also resection of the masseter muscle via an intraoral approach [12]. In our patient, the resection of the masseter muscle, which is one of the treatments available for patients with benign hypertrophy of the masseter muscle, was performed in addition to bilateral mandibular contouring osteotomy. The masseter muscle receives blood supply mainly from the masseteric artery, which is a branch of the maxillary artery. Hwang et al. [6] reported that the middle masseteric artery directly branches from the external carotid artery, and its deep branch is located close to the periosteum of the mandible in 94% of cases. Its average diameter of $1.23 \pm 0.26$ mm is large enough to allow for massive bleeding. The deep middle masseteric artery arises from the transverse facial artery (11.8%) [6]. Careless reduction of the masseter muscle may cause massive haemorrhage.

In a cadaver study, Mağden et al. [13] found that the premasseteric branch of the facial artery usually runs anterior to the masseter muscle. Given the findings in our patient, we concluded that the massive haemorrhage could be attributed primarily to the damage of the premasseteric branch of the facial artery caused by the reduction of the masseter muscle. The possibility of rupture of the premasseteric branch of the facial artery should be considered in a patient presenting with post-operative haemorrhage after resection of the masseter muscle.

Gupta et al. [10] reported that complication rates for office-based day surgery and procedures at ambulatory surgery centres and hospitals are 1.3%, 1.9% and 2.4%, respectively, and concluded that an accredited office-based day surgery is a safe alternative to in-hospital surgery for cosmetic procedures. They included various types of cosmetic surgeries, such as face-lift and rhinoplasty, but not mandibular contouring surgery. There are no studies that compare the complication rates between office-based day surgeries and hospital surgeries for mandibular contouring procedures. We recommend that the office-based day surgery for mandibular osteotomy be avoided owing to the complexity of the blood vessel anatomy and the risks of vessel injury. Well-designed studies to measure the safety of office-based day surgeries are lacking, despite a variety of cosmetic procedures being commonly offered in this setting, particularly in Asia. Surgeons should continue to carefully triage their patients, considering proper organisation, preparation, patient selection, surgical method and close collaboration with other surgeons.

4. Conclusion

We encountered a patient with massive haemorrhage after bilateral mandibular angle and plane osteotomy with resection of the masseter muscle. Although we could not confirm the source of the haemorrhage, we found evidence that it originated in the premasseteric branch of the facial artery. The massive swelling and haemorrhage were successfully controlled with bilateral ligation of the facial artery and vein. Surgeons must obtain professional experience and appropriate knowledge of anatomy and develop preparations for surgery, such as preoperative hospital consultation, when they perform surgical procedures with risks.
of serious complications in office-based settings.

Ethical approval

For this case report the scientific ethics committee approval was not required. This paper is not a research study.

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Author contribution

All authors in this manuscript contributed to the interpretation of data, and drafting and writing of this manuscript. Kosuke Kanke is first author of this paper. Takahiro Abe is corresponding author of this paper. Kosuke Kanke and Takahiro Abe conceived and designed the study and drafted the manuscript. Kosuke Kanke, Takahiro Abe, Masanobu Abe, Yoshiyuki Mori, Kazuto Hoshi and Tsuyoshi Takato were engaged in patient’s care in our hospital including surgery. All the authors read and approved the final manuscript.

Conflicts of interest

The authors have no conflicts of interest to declare.

Guarantor

Takahiro Abe.

Consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

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