The Penetration of Self-Drilling Fixation Screw into Nasotracheal Intubation Tube: An Unexpected Complication of Le Fort I Osteotomy: Case Report

Self-Drill Fiksasyon Vidasının Nazotrakeal Tüpe Penetrasyonu: Le Fort I Osteotomisinin Beklenmedik Komplikasyonu

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ABSTRACT The Le Fort I osteotomy is currently a popular technique for the treatment of maxillary deformities. Maxilla can be moved anteriorly, posteriorly, inferiorly and superiorly with Le Fort I technique. Le Fort I osteotomy is a routine procedure for oral and maxillofacial surgeons. Following advances in instrumentation and anaesthesia, it is usually carried out safely as an elective procedure in hospitals with no adverse complications. Life-threatening complications are rare. An unexpected intraoperative complication of Le Fort I osteotomy, puncture of nasotracheal intubation tube, was presented in this case report. That is why it was occured by penetration of the most upper self-drilling screw of right aperture priformis plate. The screw hole did not produce a gas leak.

Key Words: Osteotomy, le fort; complications; intubation, intratracheal

ÖZET Günümüzde Le Fort I osteotomisi maksiller deformitelerin tedavisinde kullanılan oldukça popüler bir tekniktir. Maksilla, Le Fort I osteotomisi yardımıyla anterior, posterior, superior ve inferior yönlerde hareket edebilmektedir. Le Fort I osteotomisi, oral ve maksillofasial cerrahlar tarafından rutin olarak uygulanan bir prosedürdür. Hastanelerde, anestezi ve enstrümental gelişim ile beraber ileri komplikasyonlar gözlenmeden uygulanabilen güvenli bir cerrahidir. Bu vaka raporunda Le Fort I osteotomisinin çok nadir görülen bir komplikasyonu olan nazotrakeal tüp delinmesi anlatılmaktadır. Bu komplikasyonun nedeni sol apertura priformisteki plağın self-drill vidasının tüpe penetrasyonudur. Tüpteki vida deliği gaz kaçağına neden olmamıştır.

Anahtar Kelimeler: Osteotomi, le fort; komplikasyonlar; entübasyon, intratrakeal

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The Le Fort I osteotomy with repositioning of the maxilla superiorly or anteriorly has been widely used successfully to correct dentofacial deformities. Although the operation is extensive, serious complications are rare. Maxillary osteotomies in an nasotracheally intubated patient can lead the damage to nasotracheal tube. An unexpected intraoperative complication of Le Fort I osteotomy, puncture of nasotracheal intubation tube, was presented in this case report.

CASE REPORT

This study didn't need any approval by the Hospital IRB and the patient signed an informed consent agreement and this study followed the Declaration of Helsinki on medical protocol and ethics.

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A 18 years-old female was referred to our clinic for assessment of her facial deformity. Her main complaint was a long face with excessive exposure of the maxillary teeth. She had a Class III dental malocclusion on a Class III skeletal base. She was multidisciplinary assessed in Baskent University departments of orthodontics and oral and maxillofacial surgeries. A routine orthognathic work-up was planned after orthodontic treatment. Cephalometric tracing revealed an increased lower anterior facial height with a progressive mandible. She underwent presurgical orthodontics for one year. The surgical plan consisted of a 5 mm maxillary impaction and 2 mm advancement via Le Fort I osteotomy, and; 7 mm mandibular set back via bilateral sagittal split osteotomy to gain a skeletal Class I relation.

The pre-operative physical examination and the routine blood tests were normal. The trachea was easily intubated with a preformed nasal tracheal tube (Covidien, Ireland) that has 7 mm internal diameter via her right naris.

Presurgical planned jaw movements were achieved after bone removal with a bur and rongeurs. Four miniplates and self-drilling screws were used for the fixation of maxilla and two miniplates and self-tapping screws were used for the fixation of mandible. The surgical procedure was completed at 4 hours and the intra-operative anesthetic management was uneventful.

The anesthesiologist decided to extubate the patient after attaining spontaneous breathing and regaining consciousness. The sticky strips were removed and then the air was drained from the cuff of the nasotracheal tube. The tracheal tube could not been removed out at the time of extubation. Following the try of extubation the tube several times, it was realized that naso-tracheal tube was fixed to the nasal turbinate. Even though applied the less more force to take the tube out, tube was not release. Patient head was arised with pull forces. We pushed back the tube through the trachea and rotate on own axis. Tube was release from the fixation point. A screw hole was noticed on the lateral aspect of the tracheal tube (Figure 1), which was 35 mm away from the black mark and it measured 2 mm in length.

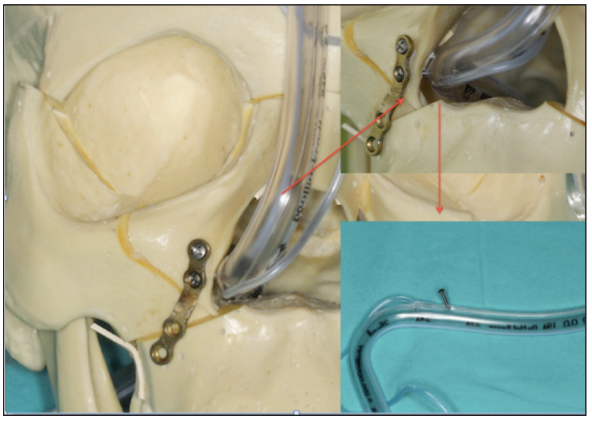

FIGURE 1: Illustration of perforation of self-drilling screw on nasotracheal intubation tube.

It was acquired that the most upper self-drilling screw of right aperture priformis plate, was penetrated into intubation tube during the fixation. The screw hole did not produce a gas leak, and; also no changes either in the peak airway pressure or in the expired minute volume were noted during the surgery. The screw position was checked via digital panoramic radiograph immediately after the orthognathic surgery and it remained its original position.

DISCUSSION

It is clear that Le Fort I surgery is a safe area of oral and maxillofacial surgery, although it carries a number of rare risk. A variety of complications have been reported such as nasal septum deviation, non-union of osteotomy gap, malposition of maxilla, nasolacrimal duct obstruction, severe hemorage, altered tear secretion secretomotor rhinopathy, frey syndrome, brain abscess, blindness etc.[1-4]

Also during osteotomy in orthognathic surgery, the tracheal tube is in danger of being partially or completely cut, a complication that can lead to failure of ventilation/oxygenation or bronchial aspiration. Normally the lateral maxillary wall is cut with a pneumatic saw and the medial maxillary wall with a guarded osteotome to minimize the risk of injuries to the tube. Several incidents have been reported however[5,6,7]

Adke et al. have reported an unusual but potentially serious airway complication of Le Fort I osteotomy in a recent paper.[7] At the time of extubation a cut was noticed on the lateral aspect of the tracheal tube which was 45 mm away from the black mark. It was an oblique cut in the longitudinal plane of the tracheal tube and it measured 12 mm in length. It was noticed that the pneumatic saw that was used on the maxilla had made the cut on the tube. The cut involved the full thickness of the wall of the tracheal tube. It had very narrowly missed the pilot tube hence the cuff was intact. Surprisingly and fortunately, this cut did not produce a gas leak same as our case. The authors discussed the management of airway loss from this complication and mentioned a metallic tube protector.

Before introducing Obwegeser nasal septum osteotome into use, there was a risk of nasotracheal tube damage during nasal septum osteotomy. Davies *et al.* described two such cases which obwegeser nasal septum osteotome effectively prevented this complication.[8] The Obwegeser nasal septum osteotome has a narrow cutting edge protected by two blunt horns that will deflect a tracheal tube or prevent it approaching the edge.

In our case, damage to the tracheal tube was carried on during fixation of maxillary osteotomy. Self-drill screws were used for fixation of the Le Fort I osteotomy. Although the application of self-tapping and non self-tapping screws is virtually universal in cranio-maxillofacial surgery, the inevitable, time consuming procedure of drilling a pilot hole has some potential disadvantages, such as damage to nerves, tooth roots or tooth germs, thermal necrosis of the bone and drill bit breakage. Self-drilling screws (DFS) are a recently developed type of osteosynthesis screws, having a tip like a cork-screw and specially formed cutting flutes which enable insertion of the screws without drilling.

On the other hand self-drilling screw decrease the hand sensitivity of surgeon during the screw penetration into the bone. Surgeon does not fell the screws in neither hard nor soft tissue. Drilling procedure before insertion of the screws, help the surgeon distinguish the soft tissue penetration. Surgeons should have attention or secure the nasotrecheal tube while using self-drilling screws at the aperture priformis.

In conclusion, during the maxillary osteotomy and similar orthognathic surgical procedures, the clinicians should be very vigilant for the immediate recognition of any damage to the nasal tracheal tube. Cooperation of anesthesiologists and surgeon is extremely important. Reintubation must be undertaken when important leaks prevent adequate ventilation and when inhalation of blood is anything but trivial.

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