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Case Report

Bilateral pneumothorax after orthognatic surgery

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ABSTRACT

Among complications in orthognathic surgery, the insurgence of pneumothorax is very rare. Pneumothorax is the presence of air or gas in the pleural cavity and it is rare complications in the postoperative oral and maxillofacial surgery patient. The clinical results are dependent on the degree of collapse of the lung on the affected side. Pneumothorax can impair oxygenation and/or ventilation. If the pneumothorax is significant, it can cause a shift of the mediastinum and compromise haemodynamic stability. While 10% of pneumothoraces are asymptomatic, patients often complain of acute chest pain and difficulty breathing. There is a reduction in vital capacity, tachycardia, tachypnoea and a decrease in partial pressure of oxygen with an inability to maintain oxygen saturations. We observed this unusual surgical consequence in a 28-year-old female with negative clinical history and instrumental evaluation after Le Fort I osteotomy and bilateral sagittal split osteotomy (BSSO). No further consequences, no neurological sequelae, no infections and no other osteotomies sequelae were seen. Sudden post-surgical dispnea associated to sub-cutaneous emphysema of the neck and of the thorax must be adequately observed with the aim of monitoring further severe sequelae. The anaesthetic management of the emergency difficult airway in any post-surgical orthognatic treatment can be extremely difficult requiring a multi-disciplinary approach.

Key Words: Orthognatic surgery complications, pneumothorax, thorax emphysema

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INTRODUCTION

Skeletal malocclusions in growing patients are managed with orthopaedic and orthodontic fixed treatment.[1-3]

In the field of orthodontics, a study was previously carried out to improve some characteristics of the orthodontic appliances (i.e., modulus of elasticity, frictional modulus).[4-6]

A combined of orthodontic and surgical treatment is necessary for patients suffering from skeletal malocclusions. In all cases, treatment begins with preoperative orthodontic setup. After the dental arches are aligned, jaw surgery is then performed so that one or both jaws are fixed in the new correct position. Orthodontic treatment continues for a long as necessary after surgery until all the teeth are brought into perfect occlusion.[7-9]

Consequences of orthognathic surgery may be various: Upper airway impairment, infections, haemorrhages during or after surgery, transient or permanent nerves injury, and mobility of the split bones.

One or more of these surgical complications are not uncommon after orthognathic surgery; instead it is extremely rare to observe as complication few hours after surgery appearance of sub-cutaneous emphysema in association to bilateral pneumothorax.

Pneumothorax is defined as the presence of air or gas in the pleural cavity and it is rare complications in the postoperative oral and maxillofacial surgery patient.

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The clinical results are dependent on the degree of collapse of the lung on the affected side. Pneumothorax can impair oxygenation and/or ventilation. If the pneumothorax is significant, it can cause a shift of the mediastinum and compromise haemodynamic stability. Air can enter the intra-pleural space through a communication from the chest wall or through the lung parenchyma across the visceral pleura.[9]

Pneumothorax may be traumatic, spontaneous with or without underlying lung disease, or iatrogenic after trauma such as barotrauma after positive pressure ventilation.[10]

Spontaneous pneumothoraces can be primary or secondary. Primary pneumothorax occurs with no underlying lung disease usually in people aged 18-40 years with an incidence of 7.4-18 cases per 100,000 per year for men and 1.2-6 cases per 100,000 per year for women. Secondary pneumothorax usually occurs in older adults with underlying disease such as chronic obstructive pulmonary disease and collagen vascular diseases including Marfan syndrome.[11,12] While 10% of pneumothoraces are asymptomatic, patients often complain of acute chest pain and difficulty breathing. There is a reduction in vital capacity, tachycardia, tachypnoea and a decrease in partial pressure of oxygen with an inability to maintain oxygen saturations.

We observed this unusual surgical consequence in a 28-year-old female with negative clinical history and instrumental evaluation after Le Fort I osteotomy and bilateral sagittal split osteotomy (BSSO). The patient was transferred to an Intensive Care Unit and treated with bilateral intercostals drains; she was kept in site for 18 days, with no further consequences.

Sudden post-surgical dispnea must be adequately observed with the aim of monitoring further severe sequelae as pneumothorax.

CASE REPORT

A 28-year-old female with clinical history and instrumental evaluation before surgery, negative for metabolic and clinical pathologies [Figure 1a], was treated with a Le Fort I osteotomy and BSSO sec. Gotte6 because of a dentoskeletal 3rd class. Surgical procedure started with difficulties in the endonasal intubation and consequent bleeding from turbinates. During surgery there was a bleeding from the left side of the retro molars venous vessel, probably cut during mandibular osteotomy. Haemorrhage was stopped by electro-coagulation and positioning of a fibrin glue patch. Surgery ended with inter-maxillary rigid fixation. The patient was transferred to an Intensive Care Unit for 24 h. She was estubated the day after at 8:45 a.m., with good cardio-pulmonary compensation. Postoperative thorax X-ray was negative [Figure 1b]. She was transferred back to our department at 12:00 p.m. with no clinical sign of airway impairment.

At 4:00 p.m. sudden dispnea associated with moderate emphysema of the cheek and peri-orbital area was seen. At 6:00 p.m. severe and sudden decrease of arterial saturation occurred, and the patient became confused; increase of the emphysema was observed that was progressively extending to the neck and the upper third of the anterior thorax. The patient was immediately transferred to the Intensive Care Unit. Removal of intermaxillary fixation (IMF), oral intubation, and a thorax X-ray showed a right tension pneumothorax, with mediastinum left shifting [Figure 2]. The intercostal drain (Pleurevac) was positioned into the right side [Figure 3]. A thorax X-ray after 4 h and a computed tomography (CT) showed a contralateral pneumothorax. This was treated with another intercostal drain (Pleurevac).

Thorax X-ray was performed every 2 days; after 7 days it was possible to restore the IMF. Both drainages were kept in site for 18 days. No further consequences, no neurological sequelae, no infections, and no other osteotomies sequelae were seen.

DISCUSSION

Thorax emphysema after orthognatic surgery is extremely rare and is reported as a progression of high-pressure air penetration through the deep fascia of the neck.[11] In our case the situation was complicated with a bilateral pneumothorax that was secondary to the emphysema. Pneumothorax (PNX) occurs by rupture of alveolar walls, due to excessive tension. The cause may be direct trauma or "volutrauma", due to excessive increase of alveolar volume. The air may expand in not only the pleural cavity, but also the mediastinum, pericardium, peritoneal cavity and, through the deep fascia of the neck, to subcutaneous tissues. As a consequence of orthognatic surgery it may happen during intubation, due to excessive final volume set on the

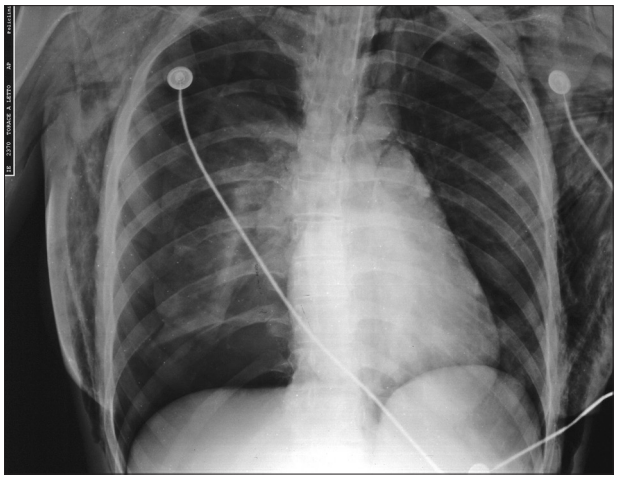

Figure 1: Postoperative chest X-ray

Figure 2: Left shift of the mediastinum

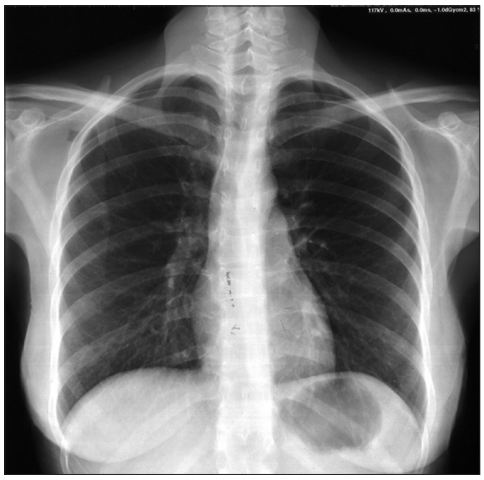

Figure 3: X-ray after bilateral thorax drainage positioning

automatic ventilator, or during the post-operative period, by contrast to airways resistance, which may be augmented due to blood clots or mucous concretions.[12]

Other causes of upper airway impairment may be ecchymosis of the oral floor, due to poor haemostasis,[13] or due to retro positioning of the mandible and the soft tissues.[14] For reduction of these complications, rigid fixation of split bones also in Gotte BSSO allows to use elastic fixation instead of steel ones.[15-18] In this way a patient is in a more comfortable situation for breathing and to eliminate mucous concretions.

CONCLUSION

Sudden post-surgical dispnea associated to sub-cutaneous emphysema of the neck and of the thorax must be adequately observed with the aim of monitoring further severe sequelae. Anaesthetic management of the emergency difficult airway in any post-surgical orthognatic treatment can be extremely difficult requiring a carefully planned multi-disciplinary approach.[13]

REFERENCES

1. Lucchese A, Manuelli M. Prediction of eruption or impaction of the third molar: Comparative analysis. Prog Orthod 2003;4/II:4-19.
2. Lucchese A, Sfondrini MF, Manuelli M, Gangale S. Fixed space maintainer for use with a rapid palatal expander. J Clin Orthod 2005;39:557-8.
3. Lucchese A, Carinci F, Brunelli G. Skeletal effects induced by twin block in therapy of class II malocclusion European Journal of Inflammation 2012;10:83-7.
4. Lucchese A, Carinci F, Brunelli G, Monguzzi R. An *in vitro* study of resistance to corrosion in brazed and laser welded orthodontic Eur J Inflamm 2011;9:67-72.
5. Lucchese A, Carinci F, Brunelli G, Monguzzi R. Everstick® and Ribbond® fiber reinforced composites: Scanning electron microscope (sem) comparative analysis. European J Inflamm 2011;9:73-80.
6. Sollazzo V, Pezzetti F, Massari L, Palmieri A, Brunelli G, Zollino I, *et al*. Evaluation of gene expression in MG63 human osteoblast like cells exposed to tantalum powder by microarray technology. Int J Periodontics Restorative Dent 2011;31:17-28.
7. Palmieri A, Zollino I, Clauser L, Lucchese A, Girardi A, Farinella F, *et al*. Biological effects of resorbable plates on normal osteoblasts and osteoblasts derived from Pfeiffer syndrome. J Craniofac Surg 2011;22:860-3.
8. Nucci P, Farronato G, Serafino M, Brusati R. Restrictive strabismus after blow-out orbital fracture in children: Is the muscle involved? J Trauma 2004;56:209-10.
9. Dimitroulis G. A simple classification of orthognathic surgery complications. Int J Adult Orthodon Orthognath Surg 1998;13:79-87.
10. Sahn SA, Heffner JE. Spontaneous pneumothorax. N Engl J Med 2000;342:868-74.

11. St-Hilaire H, Montazem AH, Diamond J. Pneumomediastinum after orthognathic surgery. J Oral Maxillofac Surg 2004;62:892-4.
12. el Deeb M, Wolford L, Bevis R. Complications of orthognathic surgery. Clin Plast Surg 1989;16:825-40.
13. van de Perre JP, Stoelinga PJ, Blijdorp PA, Brouns JJ, Hoppenreijs TJ. Perioperative morbidity in maxillofacial orthopaedic surgery: A retrospective study. J Craniomaxillofac Surg 1996;24:263-70.
14. Katakura N, Umino M, Kubota Y. Morphologic airway changes after mandibular setback osteotomy for prognathism with and without cleft palate. Anesth Pain Control Dent 1993;2:22-6.
15. Gotte P. On the surgical therapy of prognathism. Experiences and results of a modification of Obwegeser's intraoral method. Minerva Stomatol 1966;15:12-7.
16. Lucchese A, Gherlone E, Portelli M, Bertossi D. Tooth orthodontic movement after maxillofacial surgery European Journal of Inflammation 2012;10:227-32.
17. Bertossi D, Albanese M, Nocini PF, D'Agostino A, Trevisiol L, Procacci P. Arch Facial Plast Surg. 2012:12:1-7.
18. Severe maxillary atrophy treatment with Le Fort I, allografts, and implant-supported prosthetic rehabilitation. Nocini PF, Bertossi D, Albanese M, D'Agostino A, Chilosi M, Procacci P. J Craniofac Surg. 2011;22:2247-54.

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