

Bilateral Pneumothorax and Pneumomediastinum after Orthognathic Surgery

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Rezumat

Pneumomediastin și pneumotorax bilateral consecutiv chirurgiei ortognatice

Incidența complicațiilor apărute în urma procedurilor de chirurgie ortognatică este redusă, dar uneori severitatea acestora implică riscuri vitale. Este prezentat cazul unei paciente de sex feminin, în vârstă de 22 de ani la care în urma unei intervenții de chirurgie ortognatică, realizată în scopul corecției malocluziei de clasa II a apărut o complicație severă, respectiv pneumotorax și pneumomediastin bilateral.

Cuvinte cheie: chirurgie ortognatică, complicații, pneumotorax, pneumomediastin

Abstract

The occurrence of postoperative complications after various orthognathic surgery procedures is rare but all of them might be life-threatening complications. We report a case of a 22-year-old female patient who underwent a bimaxillary orthognathic surgery procedure and developed bilateral pneumothorax and pneumomediastinum.

Key words: orthognathic surgery, complications, pneumothorax, pneumomediastinum

Introduction

Postoperative complications after various orthognathic surgery procedures such as upper airway impairment, hemorrhage, infections, mobility of the facial split bones, subcutaneous emphysema, pneumomediastinum and pneumothorax is rare but all may cause life threatening complications. (1) The mechanisms for introduction of air into the mediastinal or pleural spaces are by traumatic disruption of the chest wall or cervical fascia, and by alveolar rupture due to increased intra-alveolar pressure. Pneumomediastinum that occurs after maxillofacial surgery is the result of air usually dissecting along the fascial planes of the neck. (2) Edema from nasotracheal intubation may also trigger respiratory difficulty. We report a case of a 22-year-old female patient who underwent a bimaxillary orthognathic surgery procedure and developed bilateral pneumothorax. The possible etiology is discussed with a short review of the literature as it had been reported scarcely in the last two decades.

Case report

A 22-year old female started a combined orthodontic-surgical treatment for the correction of a Class II malocclusion at the Department of Orthodontics of the “Iuliu Hațieganu” University of Medicine and Pharmacy from Cluj-Napoca, Romania. As she moved to Italy, she has been referred to the

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Figure 1. Preoperative thoracic radiological image showing a normal anatomy



Figure 2. Immediate postoperative thoracic radiological image showing normal morphology

Department of Maxillofacial Surgery of the Verona University for the surgical correction of the malocclusion. The presurgical clinical assessment, laboratory findings and chest X-ray were normal and the patient was healthy (American Society of Anesthesiologists grade I). (Fig. 1) After adequate muscle relaxation, naso-tracheal intubation was performed with moderate difficulty due to the local anatomy and caused a moderate bleeding. (3) Total intravenous anaesthesia was given with propofol (3–5 mg/kg/h) and remifentanyl (0.3–0.5 µg /kg/min). Controlled arterial hypotension (mean arterial pressure 55–80 mmHg, systolic arterial pressure 80–120 mmHg) was established mainly as a side effect of anaesthesia. All patients were initially given clonidine 1–2 µg /kg and a bolus of prednisolone 250 mg intravenously. If necessary, small bolus doses of urapidil 0.3–2 mg/kg, were given. Tissue perfusion was optimised by giving 6% /200/0.5 hydroxyethyl starch 500ml before segmentation of the maxilla. Volume-control ventilation was maintained with a tidal volume and respiratory rate of 500 ml and 10–12/min. The airway pressure was maintained at 15–18 cm H₂O, and the end-tidal carbon dioxide was 34–37 mmHg. For maintenance of anaesthesia, oxygen 1.5 L/min, nitrous oxide 1.5 L/min, and isoflurane 6–7 vol% were administered. Volume-control ventilation was maintained with a tidal volume and respiratory rate of 500 ml and 10–12 /min. The patient's vital signs were stable during surgery. The patient had a three-piece Le Fort I osteotomy and a bilateral sagittal split mandibular osteotomy (BSSO). During the BSSO procedure, moderate bleeding from the retromolars venous vessels was noticed and caused a 30 minutes delay in the surgery sequence. The patient's vital signs were stable during surgery. At the end of the bimaxillary surgery, intermaxillary elastic fixation was performed After confirming proper spontaneous breathing and recovering consciousness,

the patient was transferred to the Intensive Care Unit (ICU) for 24 hours. One day after surgery a good cardiopulmonary function was noticed and the chest X-ray showed a normal pulmonary anatomy without any clinical sign of airway impairment (Fig. 2). Considering that the patient was stable, she was transferred to the Department of Maxillofacial Surgery at 12:00 am. Five hours later the patient developed a sudden dispnea associated with a moderate emphysema of the cheeks and the bilateral periorbital area. At 7 pm a severe and sudden decrease of the oxygen saturation was noticed (81% on the pulse oxymetry) and the patient became confuse. In the meantime an increase of the emphysema which was progressively extending to the neck and the upper third of the anterior region of the chest was noticed. The patient was transferred immediately to the ICU. The intermaxillary elastic fixation was removed and an emergency oral intubation was performed. The chest radiography indicated a unilateral right tension pneumothorax with a left shift of the mediastinum A thoracostomy was performed and an intercostal drain was positioned (Pleurevac) on the right side of the chest. The follow-up radiography taken after 5 hours together with a chest CT scan indicated the presence of a contralateral pneumothorax (Fig. 3). This was treated with thoracostomy and another intercostal drain (Pleurevac) (Fig. 4). Follow-up radiographies were taken every 6 hours. From post-op day 6, a chest X-ray was taken every day, to monitor the gradual reduction of the bilateral pneumothorax After 8 days the patient showed a normal pulmonary function. The intermaxillary fixation was restored. Both intercostal drains were kept in situ for 18 days, when the chest X-ray confirmed the return to a normal morphology (Fig. 5). The patient recovered well with no further complications and was discharged from hospital on post-op day 18.

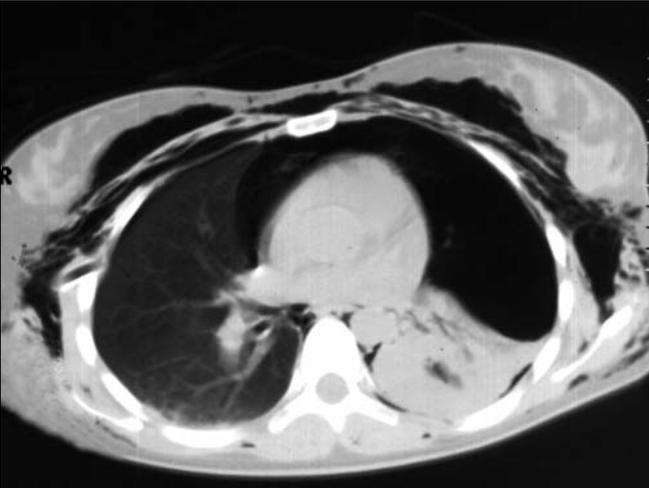


Figure 3. The CT scan indicates bilateral pneumothorax and pneumomediastinum



Figure 4. Chest X-ray showing the bilateral thoracic drainages inserted

Discussion

Bilateral pneumothorax and pneumomediastinum as a complication of orthognathic surgery are extremely rare and were reported as a consequence of the progression of high pressure air through the disrupted chest walls or cervical fascia of the neck, or by alveolar rupture due to increased intra-alveolar pressure. (4) These are clinical conditions that manifest themselves with serious respiratory distress and must be rapidly diagnosed and treated. In our case the situation might have been a complication of orthognathic surgery related to endonasal intubation when an excessive final volume is set on automatic ventilator; or it might have appeared postoperatively due to improper removal of the hemorrhage and the secretion in the oral cavity that is assumed to have led to the retention of secretion causing right lobar bronchus obstruction and atelectasis. Its classical symptoms include chest pain, difficulty in swallowing, and dyspnea varying according to the degree of the compression. The diagnosis is made clinically and radiologically following the suspicion by the clinician or is based on patient clinical condition. (Hamman's sign). The air may pass below the skin and may flow towards the neck and the face, leading to subcutaneous emphysema. In our patient, subcutaneous emphysema was especially manifest in the face, neck and upper part of the chest. Although pneumomediastinum is generally a benign and self-limiting condition that responds to conservative therapy, serious complications such as high blood pressure and/or bilateral pneumothorax, as well as cardiac compression are life-threatening situations. For the control of these complications rigid fixation of osteotomized bones and the use of elastic fixation between the jaws is strongly indicated. This way the patient has a more comfortable situation for breathing and for the physiological removal of mucous concretions. However accurate post-operative follow-up must be done in every patient to monitor possible clinical complications.



Figure 5. Postoperative chest X-ray showing the return to a normal anatomy

Pneumomediastinum and pneumothorax have been reported by Kim et al. as a complication following a bilateral sagittal split osteotomy and was treated by chest tube insertion and skin incision above the sternum. (5) Bilateral pneumothorax and pneumomediastinum after treatment with continuous positive airway (CPAP) pressure after orthognathic surgery have been also described recently by Chebel et al and were treated with chest tube insertion. (6) The authors suggest the CPAP is not indicated after the bimaxillary surgery, due to the risk of subcutaneous emphysema, pneumothorax and pneumomediastinum. Chuong et al. presented a situation with pneumomediastinum following temporomandibular joint sur-

gery and suggested the importance of careful monitoring of the patients in ICU and in the first day after surgery. (7) Over the last two decades, there are other reports of these types of complications but mainly after surgery in other areas of the body. Pneumomediastinum has been also reported as a complication after dental extraction and mandible fracture (8,9,10) The clinicians are thus suggesting the importance of respiratory follow-up after all kind of surgical procedures.

Conclusions

Patients who experience respiratory difficulty after orthognathic surgery may be suspected of having pneumomediastinum and pneumothorax, mainly when sudden acute postoperative dispnea associated to subcutaneous emphysema of the face, neck and of the thorax is noticed, and must be adequately monitored with the aim of eliminating further severe sequelae. The anaesthetic management of the difficult airway impairments in any orthognathic procedure is of extreme importance requiring a carefully planned multidisciplinary approach and care and should be a priority in all departments performing the surgical correction of various dentofacial deformities and malocclusions.

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