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VENOUS THROMBOEMBOLISM FOLLOWING ORTHOGNATHIC SURGERY: AN UNCOMMON POSTOPERATIVE COMPLICATION. CASE REPORT

TROMBOEMBOLISMO VENOSO TRAS CIRUGÍA ORTOGNÁTICA: UNA COMPLICACIÓN POSTOPERATORIA INUSUAL. REPORTE DE CASO

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ABSTRACT

Pulmonary thromboembolism (PTE) is a potentially life-threatening complication, particularly in certain major surgical procedures such as orthopaedic, urological, gynaecological, or abdominal surgeries. However, its incidence in maxillofacial surgery is low and uncommon, especially in patients without evident risk factors. The debate over the need to establish clinical practice guidelines for the routine use of thromboprophylaxis in cranio-maxillofacial surgery remains controversial, despite the growing need to review and update preventive protocols for thromboembolic events in these procedures. This study describes the case of a 31-year-old woman with no risk factors for thromboembolic

events who developed a PTE confirmed by CT pulmonary angiography 12 hours after undergoing bimaxillary orthognathic surgery. A transdisciplinary approach and early anticoagulant therapy were essential for the patient's proper postoperative recovery, resulting in a favourable outcome.

Keywords: Venous thromboembolism, pulmonary embolism, thromboembolic events, orthognathic surgery, case report.

RESUMEN

El tromboembolismo pulmonar (TEP) es una complicación potencialmente mortal, especialmente en ciertos procedimientos quirúrgicos mayores como las cirugías ortopédicas, urológicas, ginecológicas o abdominales. Sin embargo, su incidencia en la cirugía maxilofacial es baja e infrecuente, especialmente en pacientes sin factores de riesgo evidentes. La necesidad de establecer guías de práctica clínica para el uso rutinario de tromboprofilaxis en cirugía cráneo-maxilofacial sigue siendo un tema controvertido, a pesar de la creciente necesidad de revisar y actualizar los protocolos preventivos frente a eventos tromboembólicos en este tipo de procedimientos. Este estudio describe el caso de una mujer de 31 años, sin factores de riesgo para eventos tromboembólicos, que desarrolló un TEP confirmado mediante angiotomografía pulmonar 12 horas después de someterse a una cirugía ortognática bimaxilar. El abordaje transdisciplinar y el inicio precoz de la terapia anticoagulante fueron fundamentales para una adecuada recuperación postoperatoria, con un desenlace clínico favorable.

Palabras clave: Tromboembolismo venoso, embolia pulmonar, eventos tromboembólicos, cirugía ortognática, reporte de caso.

INTRODUCTION

Venous thromboembolism (VTE) encompasses two closely related conditions: deep vein thrombosis (DVT) and pulmonary thromboembolism (PTE)[1,2]. PTE occurs when a blood clot formed in the deep veins of the legs or other parts of the body travels to the lungs. Once lodged in the pulmonary trunk or one of the segmental pulmonary arteries, it blocks the flow of deoxygenated blood from the right ventricle to the lungs, preventing proper oxygenation[1-4].

VTE is a common complication in major surgeries and is associated with risk factors such as obesity, advanced age (> 40 years), malignancy, use of oral contraceptives, heart failure, a history of VTE, and the presence of systemic comorbidities[1,3,4]. Its incidence is particularly high in orthopaedic, urological, gynaecological, and general surgical procedures[4]. However, in craniofacial surgery, the reported postoperative incidence ranges from 0.15 % to 1.5 %[1,3,4].

Between 30 % and 50 % of DVT cases are asymptomatic[2-4]. However, DVT may present with lower limb oedema, erythema, and pain[4]. If it progresses to PTE, signs and symptoms can include dyspnoea, pleuritic or substernal chest pain, cough, haemoptysis, tachypnoea, tachycardia, cyanosis, altered mental status, and syncope[4].

The aim of this article is to present a clinical case of PTE in a woman who underwent bimaxillary orthognathic surgery. This case highlights the importance of considering thromboembolic risk even in seemingly low-risk contexts and underscores the need to review and update preventive protocols in maxillofacial surgery.

CLINICAL CASE

A 31-year-old woman with no relevant medical history was diagnosed with Class III dentofacial deformity (DFD), mandibular asymmetry, and dextrognathism (Figure 1 A-C). She underwent bimaxillary orthognathic surgery in 2024. A bilateral sagittal split mandibular osteotomy was performed, achieving a 10.2 mm advancement on the right side and 2 mm on the left. This was followed by a Le Fort I osteotomy with a 6 mm

maxillary advancement, 1 mm right-side impaction, 1.4 mm left-side translation, and 4° counterclockwise rotation. A 4 mm genioplasty was also performed. Fixation was completed using standard plating techniques and absorbable sutures (Figure 1 D-G).

Standard anaesthetic and adjunctive medications were administered intraoperatively, including analgesics, sedatives, and antiemetics. Estimated blood loss was 200 cc, and total surgical time was 3.5 hours. The patient was transferred to the Post-Anaesthesia Care Unit (PACU) with an oxygen saturation of 80 %, supported with low-flow oxygen via face mask at 3 L/min, and was later cleared for transfer to the general ward.

Twelve hours postoperatively, the patient developed acute respiratory distress with dyspnoea, hypoxaemia (SpO_2 72 %), and signs of ventilatory failure. She was placed on a non-rebreather mask at 15 L/min; however, due to lack of improvement, orotracheal intubation (#7.5 tube fixed at 22 cm) was performed following preoxygenation, and she was transferred to the Intensive Care Unit (ICU) with suspected pulmonary thromboembolism (PTE).

Pulmonary CT angiography (angio-CT) revealed acute PTE, with filling defects in the upper and lower lobar arteries of the right lung, along with a wedge-shaped pulmonary infarct in the lower lobe (Figure 2). The patient was placed on mechanical ventilation with the following settings: FiO_2 100 %, PEEP 8 cmH_2O, tidal volume (VT) 435 ml (7.5 ml/kg). Arterial blood gas analysis showed respiratory acidosis and severe impairment of gas exchange. Anticoagulation therapy with enoxaparin 70 mg every 12 hours was initiated.

During her ICU stay, haemodynamic stabilisation and progressive improvement in oxygenation were achieved (Figure 3 A-B). On postoperative day 3, transthoracic echocardiography showed a preserved left ventricular ejection fraction (LVEF) of 63 %, normal diastolic function, mild tricuspid regurgitation, and signs of mild pulmonary hypertension. Given her favourable clinical progress, she was discharged on postoperative day 5 with oral anticoagulation (apixaban 5 mg every 12 hours).

Outpatient follow-up by the Oral and Maxillofacial Surgery Department revealed a satisfactory postoperative course (Figure 3 C-E). Follow-up imaging confirmed cardiovascular stability and no evidence of ongoing thrombosis. The patient completed six

months of full anticoagulation therapy, after which the Internal Medicine Department discontinued treatment. She is currently undergoing monthly follow-up to monitor her systemic and postoperative condition.

DISCUSSION

The risk of venous thromboembolism (VTE) in maxillofacial surgery is considered low, with reported rates ranging from 0.15 % to 1.5 %[3,4]. Omesiete et al.[1] found an overall VTE incidence of 0.55 % among 4,981 craniofacial surgery patients between 2008 and 2013, with the lowest rate in orthognathic procedures (0.24 %). Similarly, Verlinden et al.[2] reported only two symptomatic thromboembolic events among 4,127 patients undergoing orthognathic surgery without pharmacological thromboprophylaxis. These findings support the generally low thromboembolic risk in maxillofacial surgery. Nonetheless, the present case illustrates that serious events such as pulmonary thromboembolism (PTE) can still occur in the absence of identifiable risk factors.

Risk stratification varies according to the type of procedure and the patient's systemic status. Key factors include advanced age, prolonged operative time (> 3 hours), cardiovascular comorbidities, and the use of general anaesthesia, which may increase thrombotic risk due to venous stasis from vasodilation[4-6]. In female patients, a thorough gynaecological history and assessment of hormonal contraceptive use—including oral and subdermal methods—are essential, as seemingly minor factors may influence thrombosis risk[6].

According to the Caprini risk assessment model, low-risk patients have a < 1 % probability of developing VTE, compared to 10-40 % in moderate-risk, and up to 80 % in high-risk patients, with PTE-related mortality reaching 10 %[3,4]. Despite being classified as very low risk, the patient in this case developed acute PTE, highlighting the limitations of existing models and the need for vigilant, individualised clinical evaluation.

Roughly 50 % of deep vein thrombosis (DVT) cases are asymptomatic and may resolve spontaneously[2,4]. In contrast, PTE can manifest with dyspnoea, tachypnoea, chest pain,

haemoptysis, and oxygen desaturation, as observed in this patient[7]. Diagnostic confirmation relies on imaging: Doppler ultrasound offers 98 % sensitivity and 94 % specificity for DVT, while computed tomography pulmonary angiography (CTPA) remains the gold standard for PTE due to its high diagnostic accuracy[8].

Thromboprophylaxis includes mechanical methods (e.g., compression stockings, pneumatic devices) and pharmacological options (e.g., low-molecular-weight heparin [LMWH], oral anticoagulants)[7-10]. While LMWH is effective, it carries a bleeding risk and should be used selectively in orthognathic procedures based on surgical time and individual risk[1]. Early mobilisation and pneumatic compression are generally safe and effective. In this case, the patient responded well to LMWH followed by oral anticoagulation, with a favourable clinical outcome.

CONCLUSION

This case highlights the limitations of current thromboembolic risk assessment tools in maxillofacial surgery, particularly in young, low-risk patients. It underscores the importance of thorough medical history, close postoperative monitoring, and personalised prophylactic strategies. Furthermore, it calls for continued research and regular protocol updates in thromboprophylaxis, guided by a multidisciplinary, evidence-based approach tailored to the patient's clinical context and procedural characteristics. Such measures are essential to enhance patient safety and prevent potentially life-threatening complications.

CONFLICT OF INTEREST

None.

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Figure 1. A-C: preoperative clinical photographs. D-E: 3D virtual surgical planning.

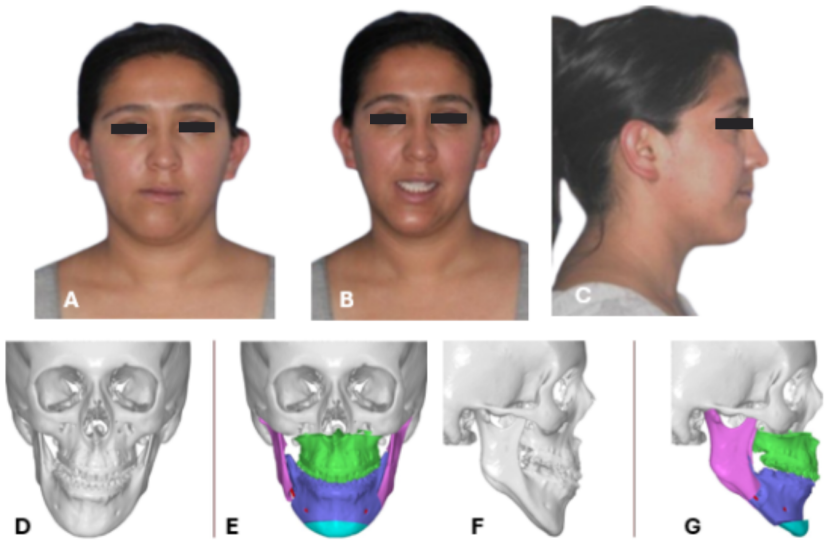

Figure 2. CT pulmonary angiography (CTPA). Pulmonary thromboembolism with filling defects in the upper and lower lobar branches of the right pulmonary artery. The lower lobe shows an associated pulmonary infarction.

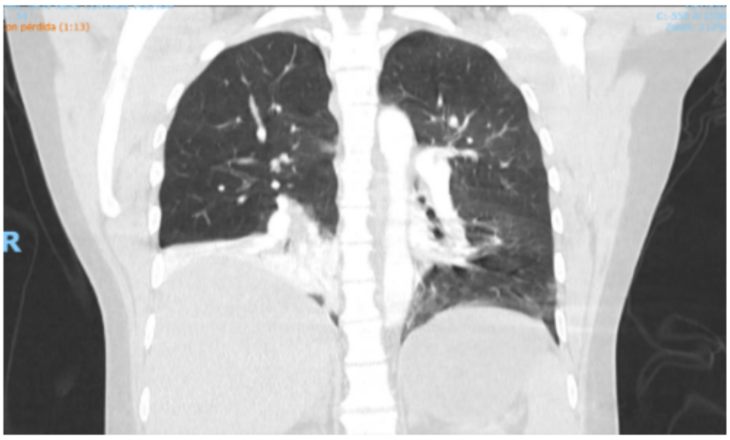

Figure 3. A-B: clinical photographs following admission to the Intensive Care Unit (ICU). C-E: current clinical condition.