

Airbag cover impact: a rarely seen reason for mandibular defects

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ABSTRACT

Airbags and seatbelts are among the primary means of preventing severe injuries after motor vehicle accidents. Nonetheless, many studies have examined injuries that were related to airbag deployment. To our knowledge, this is the first case report of multiple mandible fractures caused by impact with the airbag cover. Removal of non-viable bone fragments was performed and the resulting hemi-mandible defect was reconstructed with a free iliac crest flap. A radial forearm free flap was used to reconstruct the mucosal defect. Airbags can prevent deadly injuries; however, they can also cause serious harm to the maxillofacial bones at the time of deployment.

Keywords: Accidents; air bags; free tissue flaps; motor vehicles; traffic.

INTRODUCTION

Many people get injured or die in car crash accidents every day around the world. Airbags are one of the most important inventions of the 20th century that save lives and decrease car crash-related morbidity.^[1] However, airbags can cause injury or death when used without paying attention to precautions. In this report, we present a case of mandibular defect caused by high-energy crash of airbag cover that needed two consecutive free-flap surgeries for reconstruction. Although the car velocity was low, the impact pressure of the airbag deployment was very high due to the absence of a seatbelt.

CASE REPORT

All procedures in this study were performed in accordance with the ethical standards of the institutional research committee and the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The patient signed a written informed consent.

A 38-year-old male patient requiring microsurgical mandibular reconstruction was referred to our department from a state hospital. He was injured in a car crash due to the collision of the cover of the airbag with the steering wheel (Fig

1a). A surgery was performed in the first admitted hospital to excise the airbag cover and to debride small pieces of the fractured mandible. The resulting mandibular defect was reconstructed with plate and screws to avoid its collapse. The patient had a near hemi-mandibular defect when he was referred to our hospital (Fig. 1b). An osteocutaneous iliac free flap was used in the first stage to reconstruct the mandibular defect. The left facial artery and vein were used as first recipient vessels. The cutaneous component was added for monitoring of the flap viability. Hematoma formation was observed on the first postoperative day; the hematoma was drained in the operating room, and the vascular anastomoses were seen as patent. On the seventh postoperative day, the cutaneous component of the iliac flap was excised and the defect was primarily repaired. In the early postoperative period, intraoral wound dehiscence and mucosal defect were observed. A second surgery was performed, and a radial forearm free flap was used to reconstruct the intraoral defect on the 14th postoperative day. The right facial artery and vein were used as recipient vessels for radial forearm flap. The tracheostomy defect was closed in the second postoperative month; debulking of the radial forearm flap was done in the eighth postoperative month. No late postoperative complications were seen. The jaw movements were evaluated as mod-

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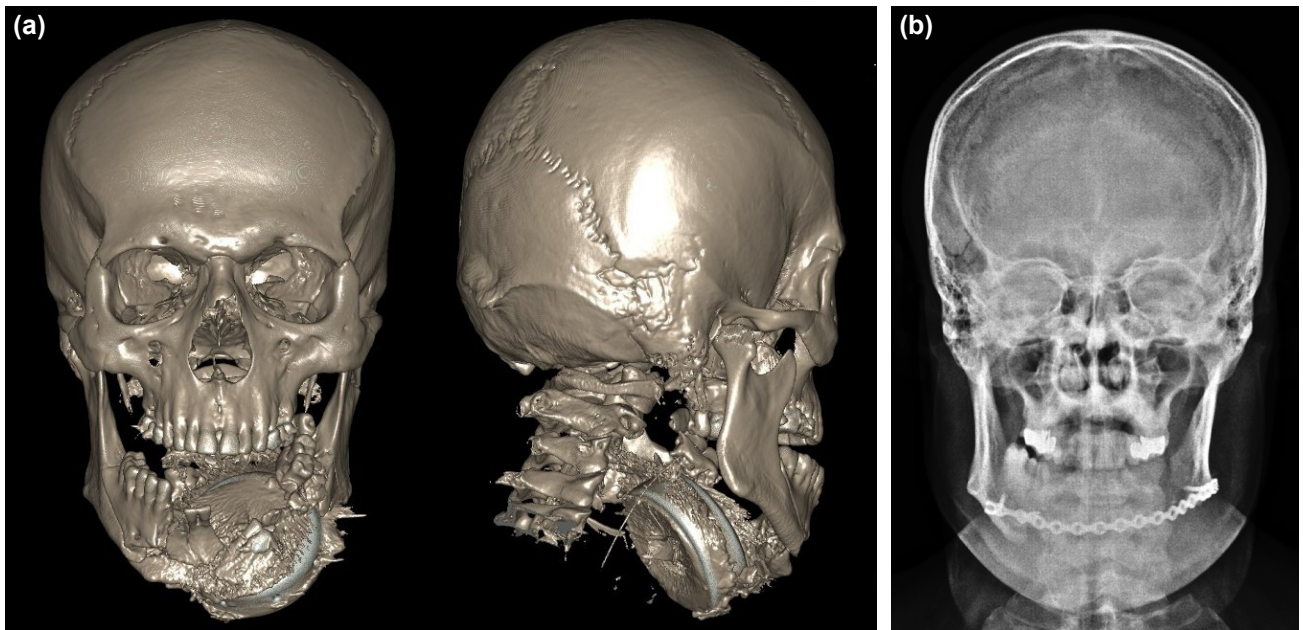


Figure 1. (a) Anterior and lateral oblique view of the three-dimensional computed tomography of the patient. The cover of the steering wheel was embedded into the mandible causing a multi-segment fracture. (b) After excision of the airbag cover and removal of necrotic bone segments, left hemi-mandibular defect was temporarily repaired with plate and screws to prevent its collapse.

erate-good in the late postoperative period (Fig. 2a-c). Both the patient and the surgeons were satisfied with the result.

DISCUSSION

Maxillofacial bone fractures usually occur in motor vehicle accidents; these fractures can occur either as an isolated injury or can be accompanied by other injuries including those to extremities as well as cranial and spinal injuries. Airbags are lifesaving technologic devices; however, some mandatory rules need to be followed for the beneficial use of these devices. Simoni et al.^[2] have found significant benefits

of using together airbags and seatbelts on the occurrence of facial fractures. Airbag deployment usually causes minor injuries including abrasions, contusions, and lacerations.^[3] In the presented case, the patient was driving without wearing a seatbelt. A relatively low-velocity motor vehicle crash (at 40 km/h) occurred when the patient was paying attention to his new car's music system. To our knowledge, this is the first report of a multi-segment mandible fracture caused by the embedding of an airbag cover on the steering wheel into the mandible. Aggressive debridement and removal of the necrotic bone segment had been performed in another city hospital, resulting in a hemi-mandibular defect. We planned

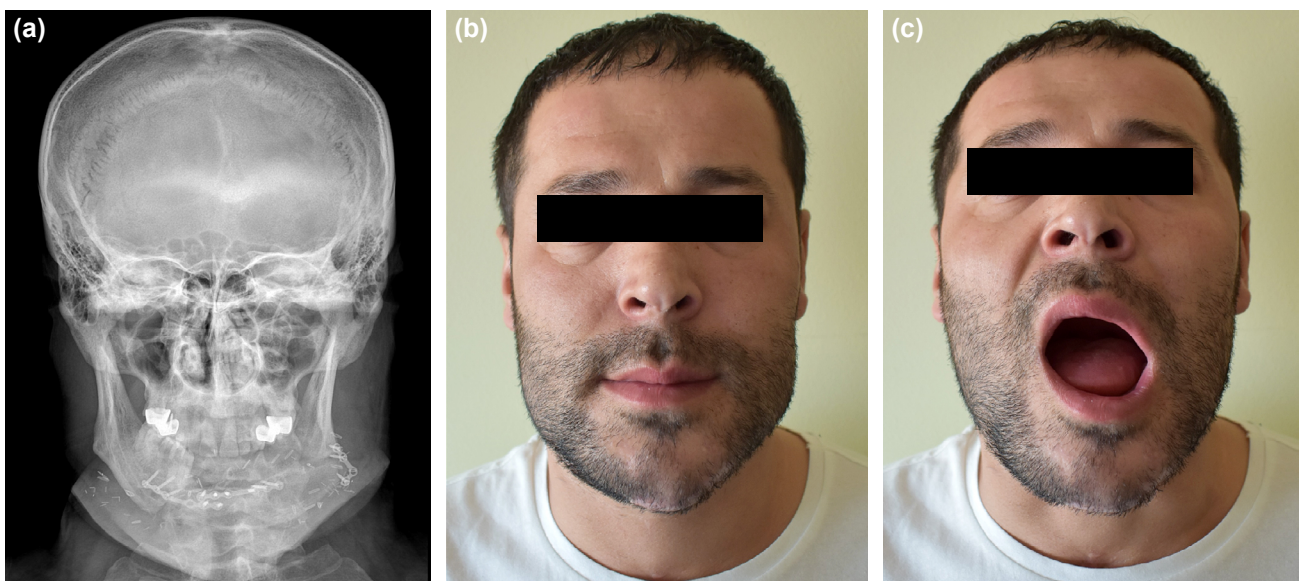


Figure 2. (a-c) Postoperative radiograph and view of the patient. The iliac crest free flap was properly incorporated to the defect. The occlusion and mouth opening was very good.

free iliac bone-skin flap for reconstruction of defects involving the corpus-angulus regions of the mandible. The greatest advantage of the iliac flap was that it did not require an extra osteotomy because the mandible shape was similar to the original shape of iliac bone, and thus, flap viability was more reliable. Wound dehiscence has been seen in the intraoral side of the closure in the follow-up period; thus, we had to perform a second reconstructive procedure. The radial forearm free flap was chosen for the reconstruction of intraoral defect because of its pliable nature.

In conclusion, this is the first report of a multi-segment mandibular fracture caused by the collision of the airbag cover. There is no reported data on the biomechanical effect of steering wheel-airbag cover impact at the time of motor

vehicle accidents. The case presented here is an example of an unexpected significant mandibular defect caused by embedding of airbag cover into the mandible that needed complex reconstructive procedures.

Conflict of interest: None declared.

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OLGU SUNUMU - ÖZET

Hava yastığı kapağı çarpması: Mandibula defektinin nadir görülen bir sebebi

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Motorlu taşıt kazalarından sonra ağır yaralanmalar için hava yastıkları ve emniyet kemerleri ana koruma yöntemidir. Hava yastığının açılması sonucu meydana gelen yaralanmalar hakkında birçok çalışma bildirilmiştir. Bu olgu sunumu, hava yastığı kapağının çarpmasından kaynaklanan çoklu mandibula kırığı ile sonuçlanan ilk olgu sunumudur. Canlı olmayan kemik parçaları debride edildi ve ortaya çıkan hemimandibula defekti serbest iliak krest flebi ile rekonstrükte edildi. Mukozal defekti yeniden oluşturmak için radyal ön kol serbest flebi yapıldı. Hava yastıkları, önlemlere göre kullanıldığında ölümcül yaralanmaları önler. Bununla birlikte, açılma sırasında maksillofasiyal kemiklere ciddi şekilde zarar verebilirler.

Anahtar sözcükler: Hava yastıkları; kazalar; motorlu taşıtlar; serbest flepler; trafik.

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