

RIGHT ZYGOMATICOMAXILLARY COMPLEX FRACTURE WITH RUPTURE OF INTERNAL MAXILLARY ARTERY: A CASE REPORT

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ABSTRACT

Background: This case report gives prominence to the risk of delayed, possibly life - threatening bleeding following mid-facial fractures.

Methods: A 42-year-old male was involved in an accident during which he suffered from right zygomaticomaxillary complex fractures with massive bleeding. The hemoglobin level was decreased from 11 to 5 g/dL, suspected caused by rupture of internal maxillary artery. Incidence of massive bleeding due to zygomaticomaxillary complex fracture is quite rare. Patient also felt right visual loss due to retrobulbar hematoma compression. He was given nasal tampon and transfusion in referral hospital. The patient had fracture reconstruction (reduction and fixation), ligation of right facial artery and temporary ligation of external carotid artery with Ethilooop for 5 days. Nevertheless, the bleeding still occurred. The patient then underwent Digital Subtraction Angiography (DSA) and coiling procedure from radiologic intervention. Twenty days after last procedure, we ligated the right external carotid artery due to recurrence of bleeding.

Results: There are many modalities and procedure for the therapy of massive bleeding on midface fracture, ranging from conservative, minimal invasive to operative surgery. Patient that has gone through DSA procedure can still bleed. After ligation of external carotid artery, no more bleeding occurred.

Conclusion: Patient suffering from extensive midfacial fracture, the internal maxillary artery and its branches are at special risk of injury due to their close anatomical relationship to bony structures. Its bleeding is possibly life threatening. Tampon and nasal packing are non-essential initial treatment, but digital pressure procedure can be performed to stop the bleeding temporarily. Ligation of external carotid artery is the best choice of treatment for permanent outcome.

Keyword: Zygomaticomaxillary complex fracture, internal maxillary artery rupture, DSA, and external carotid artery ligation

ABSTRAK

Latar Belakang : Laporan kasus ini memberi penekanan pada risiko perdarahan yang terlalu lama, kemungkinan hingga mengancam nyawa, akibat fraktur midfasialis.

Metodologi : Seorang pasien pria berusia 42 tahun terlibat dalam kecelakaan sehingga ia mengalami fraktur zigomatikomaksilaris kompleks yang disertai dengan perdarahan hebat. Kadar hemoglobin turun dari 11 menjadi 5 g/dL, diduga akibat rupturnya arteri maksilaris interna. Insidensi perdarahan hebat akibat fraktur zigomatikomaksilaris kompleks termasuk jarang. Pasien juga mengeluh kehilangan penglihatan pada mata kanannya akibat kompresi hematoma retrobulbaris. Ia diberikan tamponade nasal dan transfusi pada rumah sakit rujukan. Pasien menjalani rekonstruksi (reduksi dan fiksasi), ligasi arteri fasialis dextra, dan ligasi sementara dari arteri karotis eksterna dengan benang Ethilooop selama 5 hari namun perdarahan masih berlanjut. Pasien kemudian menjalani *Digital Subtraction Angiography* (DSA) dan prosedur *coiling* dari radiologi intervensi. 20 hari setelah tindakan terakhir, kami meligasi arteri karotis eksterna dextra akibat terjadi perdarahan yang berulang kembali.

Hasil : Terdapat banyak modalitas dan prosedur untuk terapi perdarahan hebat akibat fraktur midfasialis, mulai dari penanganan konservatif, invasif minimal hingga operasi. Pasien yang telah menjalani prosedur DSA dapat tetap mengalami perdarahan. Setelah ligasi arteri karotis eksterna, perdarahan berhenti.

Kesimpulan : Pada pasien penderita fraktur midfasialis ekstensif, arteri maksilaris interna dan cabang - cabangnya sangat rentan terluka akibat lokasi anatomisnya yang dekat dengan tulang. Perdarahan dari arteri ini dapat mengancam nyawa. Tampon dan *nasal packing* tidak esensial pada penanganan awal, namun prosedur penekanan digital dapat dilakukan untuk menghentikan perdarahan sementara. Ligasi arteri karotis eksterna merupakan pilihan terapi yang paling tepat untuk hasil permanen.

Kata Kunci : Patah pada tulang zigomatikomaksilaris kompleks, robek arteri maksilaris interna, DSA dan ligasi arteri karotis interna

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INTRODUCTION

The facial artery injuries have been reported in trauma cases with incidence ranging from 1 to 11%¹. Oronasal bleeding is a common physical finding following injury to the maxillary artery and its branches². Injury to maxillary artery can cause intractable bleeding because it is one of the External Carotid Artery (ECA) branches, an easily damaged artery following facial trauma³. If pressure packing and hemostatic agents cannot effectively control the bleeding, ECA ligation or Transcatheter Arterial Embolization (TAE) may be employed³. This article reports a case of internal maxillary artery injury due to traumatic mechanism of injury. It is believed that this type of injury may present diagnostic and therapeutic challenges to the physicians in emergency settings. Risk of delayed, possibly life-threatening bleeding following midfacial fractures is highlighted in this article.

Case Report

A 42-year-old male who was injured by a motorcycle accident suffered from right zygomaticomaxillary complex fractures with facial deformity, multiple facial laceration, massive facial and oronasal bleeding (Figure 1A). His condition in previous referral hospital was alert with Glasgow Coma Scale (GCS) Score of 15 but in hypovolemic state with Blood Pressure (BP) of 90/57 mmHg and heart rate of 100 beats per minute (bpm) with weak pulse. Initial Hemoglobin (Hb) level was 11 g/dL and decreased to 5 g/dL in approximately six hours. Approximately 1,500 mL of blood transfusion was given. The patient underwent facial and nasal packing with tampon gauze initially to prevent obstruction of the airway. Brain and facial Computed Tomography (CT) Scan showed right zygomaticomaxillary complex facial bone fractures and pneumocephalus without intracranial hemorrhage (Figure 1B).

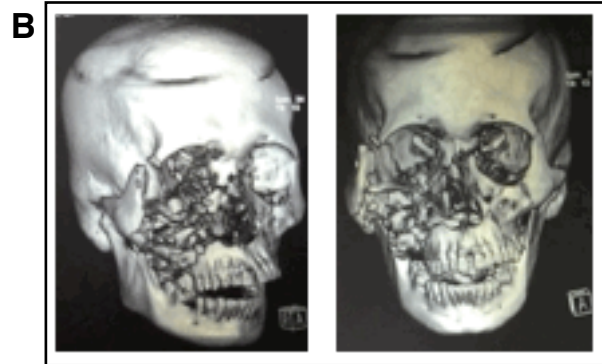


Figure 1B. CT Examination

The patient was referred to our hospital after his condition has been stabilized. It was suggested from examination that the bleeding was coming from either right facial artery or right internal maxillary artery. There was right visual loss indicating retrobulbar hematoma compression. We planned to explore and control the bleeding, and to perform Open Reduction Internal Fixation (ORIF) using plate - screw. Intraoperative finding we found the bleeding from right facial artery. We ligated the artery and external carotid artery was ligated temporarily with ethiloop. The fracture site performed ORIF with plate - screw, archbar and intermaxillary rubber (Figure 2).

Five days following the surgery, we removed the ethiloop. Nevertheless, the bleeding occurred again for 4 times, so a non - invasive modality (Emergent Conventional Angiography) was performed. Selective angiography of right external carotid arteries demonstrated contrast extravasation in the distal branches of Internal Maxillary Artery (IMA) (Figure 3A). Digital Subtraction Angiography (DSA) Endovascular Embolization and coiling procedure was immediately executed and after the procedure, right External Carotid Arteries (ECA) Angiography did not show contrast extravasation in the distal branches of right IMA (Figure 3B). Selective angiography on the left ECA also showed no sign of contrast extravasation in the distal branches of left IMA (Figure 3C).

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Figure 2. First operation for fracture reconstruction (reduction and fixation), ligation of right facial artery and temporary ligation of external carotid artery with ethilloop

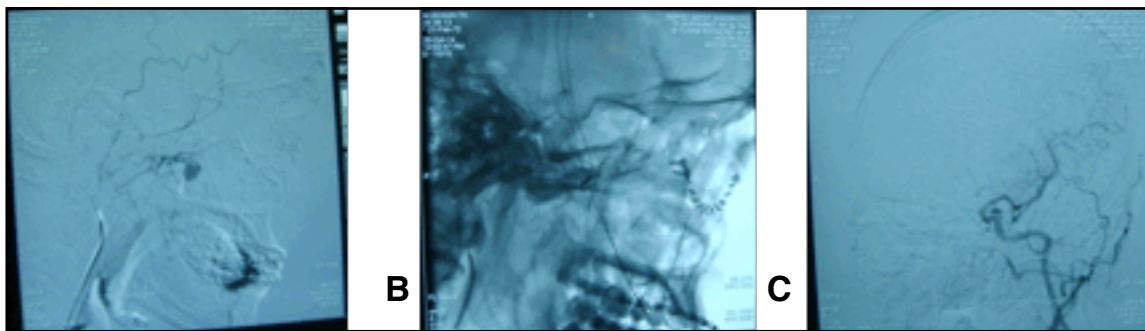


Figure 3A. Selective angiography of right external carotid arteries demonstrated contrast extravasation in the distal branches of internal maxillary artery. **Figure 3B.** DSA Endovascular Embolization and coiling procedure was performed. After the procedure, right ECA Angiography showed disappearance of the extravasation in the distal branches of right internal maxillary artery. **Figure 3C.** Selective angiography on the left ECA demonstrated no contrast

Twenty days after the procedure, massive bleeding transpired. Right external carotid artery ligation was performed (Figure 4) and following this procedure the bleeding was never occurred in 1 month follow up (Figure 5).



Figure 4. Second operation for ligation at right external carotid artery



Figure 5. Patient after 1 month follow up

DISCUSSION

Adequate airway protection should be considered primarily in maxillofacial fractures patients with massive facial and oronasal bleeding to avoid life-threatening problems such as airway obstruction and aspiration. Patients with life threatening massive bleeding following maxillofacial fractures should be suspected with many possibilities other than oronasal bleeding that are responsible for the patient's condition⁴. The main vessel responsible for intractable bleeding after midfacial fracture is the internal maxillary artery and the interosseous branch of external carotid artery, as well as its branches. In most mild to moderate bleeding, nasal packing or tamponed with balloon catheters are thought to be effective procedures^{5,6}. However, in cases of severe oronasal bleeding, tight oronasal packing is frequently ineffective because the bleeding may originate from the oral cavity and not from nasal cavity. Hematoma can also compresses eye bulbar causing patient to have visual loss^{7,8}. Patients with multiple facial bone fractures, there are only soft tissue but no solid wall for the packing to stop massive bleeding in oronasal cavity⁶. If the injury is located at or proximal to the second part of IMA, which is defined as lateral to the lateral pterygoid muscle, adequate bleeding control cannot be achieved by packing⁹. Ligation of the ECA has been suggested as an alternative treatment, but it has failed to show consistent efficacy in stopping the bleeding⁵. It is difficult to identify the exact injured vessels among the complicated anatomic structures, and there are abundant collateral vessels responsible for bleeding recurrence.

Immediate temporary reduction of the fracture bone is suggested as another choice to control the bleeding^{4,10}. However, there are some disadvantages as follows: it has some risks for critical patients to undergo general anesthesia and it is difficult to perform reduction of the fracture bone because of massive bleeding and severe tissue swelling¹¹. Angiographic intervention is useful for diagnosing and locating the injured vessel and providing a therapeutic method for embolization. Endovascular embolization is considered the better choice for stopping intractable oronasal bleeding^{5,6,11}.

Sakamoto et al. described the first series of treatment by angiographic embolization in patients with severe oronasal bleeding after blunt maxillofacial trauma. They performed carotid angiography in 13 patients, and 4 patients had extravasation of contrast media from the ECA. Successful bleeding control was achieved in 4 patients by endovascular embolization. They treated the other 9 patients with nasal packing. Bleeding focus from ICA was visualized by angiography in 8 of the 9 patients, but the bleeding in all of these patients was failed to control¹². Komiyama et al. reported six patients with bilateral vessel injuries after trauma, five of which had received blood transfusions of more than 10,000 mL. Two of them deceased, two were in a vegetative state, and one had moderate disability; only one patient had a good recovery⁶. The patient in this article went through bleeding process again despite embolization and coiling procedure. He was then recovered permanently after ligation of external carotid artery.

CONCLUSION

Patients suffering from extensive midfacial fracture are at special risk to injure their internal maxillary artery and its branches due to their close anatomical relationship to bony structures. Initial life-saving managements, secure the airway and preventing hypovolemic shock are necessary and endovascular embolization may be considered but it is not a preferable option for the life threatening bleeding from bilateral internal maxillary artery injury. Tampon and nasal packing are not considered for initial treatment either, but digital pressure procedure in our case was proven to be effective in controlling the bleeding temporarily.

Ligation of external carotid artery carotid is the best treatment of choice in controlling the bleeding permanently.

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