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Abruption of the common carotid artery origin with no neurological impairment

Abrupcija na polazištu zajedničke karotidne arterije bez neurološkog deficita

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Abstract. ***Objective:*** In this case, we present a patient who despite iatrogenic common carotid artery disruption had no neurological impairment after vascular reconstruction. ***Case report:*** During the neck dissection in a young patient a complete abruption of the common carotid artery occurred. Median sternotomy was done for proximal bleeding control. Vascular reconstruction was done using temporary carotid shunting. The patient had no neurological consequences afterward. ***Conclusion:*** The lesion of major neck vessels is one of the most severe complications during the surgery which must be dealt with as soon as possible in best way in order to avoid permanent brain damage. In situations of iatrogenic lesions of major neck arteries heparin admission, which is usually normal therapy during vascular reconstruction, is not an option due to abrupt and uncontrollable bleeding. Thus, establishing surgically proximal and distal vascular control over the bleeding artery by vessel clamping and urgent placing of temporary intraluminal carotid shunting and best medical intraoperative therapy in this critical period of surgery might be the crucial therapeutic moment for brain protection.

Key words: carotid artery injury; neck dissection; sternotomy

Sažetak. ***Cilj:*** U ovom prikazu slučaja predstavljamo pacijenticu koja usprkos jatrogenoj leziji zajedničke karotidne arterije nije imala neuroloških oštećenja nakon vaskularne rekonstrukcije. ***Prikaz slučaja:*** Tijekom disekcije vrata kod mlade pacijentice došlo je do potpune abrupcije zajedničke karotidne arterije. Mediana sternotomija napravljena je za postizanje proksimalne kontrole krvarenja. Rekonstrukcija krvnih žila izvršena je uz upotrebu privremene karotidne premosnice. Pacijentica nakon operacije nije imala neuroloških posljedica. ***Zaključci:*** Ozljeda velikih krvnih žila vrata jedna je od najtežih intraoperacijskih komplikacija koja se mora riješiti u najkraće moguće vrijeme na najbolji način da se izbjegne nepovratno oštećenje mozga. U situacijama jatrogenih lezija velikih arterija vrata nije moguće davanje heparina koji je inače normalna terapija tijekom vaskularne rekonstrukcije jer pacijent abruptno i nekontrolirano krvari. Stoga, kirurška uspostava proksimalne i distalne vaskularne kontrole kod krvareće velike arterije klemanjem te što žurnije postavljanje privremene karotidne intraluminalne premosnice uz davanje najbolje intraoperacijske terapije lijekovima u datom trenutku može biti presudan terapijski trenutak za zaštitu mozga.

Ključne riječi: disekcija vrata; ozljeda karotidne arterije; sternotomija

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INTRODUCTION

Major injury of the common carotid artery (CCA) during surgery is very rare, mainly in patients with connective tissue disorder or neck irradiation and it has most serious consequences – death due uncontrollable bleeding or stroke due to cerebral ischemia[1-3]. In this case report we present a young patient with a major iatrogenic intraoperative carotid artery injury, who despite all of those negative predictive factors and intraoperative circumstances, after the vascular reconstruction, had no consequent brain damage or clinical neurological impairment.

Proximal vessel control, surgeon's accurate instant decisions and prompt blood-flow restitution using a temporary vascular shunt in cases of iatrogenic major vessels injury are of utmost importance in brain-injury prevention.

A quick multidisciplinary team-enrolment in a tertiary health care centres rises the patient's chances to overcome at first futile situation to a complete recovery without any neurological damage.

CASE REPORT

A 28-year-old female patient underwent for the third time neck dissection after radio- and chemotherapy due to disseminated thyroid gland papillary carcinoma. Preoperative positron emission tomography computed tomography (PET CT) confirmed a metastatic lymph node behind and closely related to the CCA sheet in the right supraclavicular region. During opened surgical lymph node separation, the major arterial bleeding occurred and instant manual compression was initiated. The lesion of the right CCA was suspected. Due to the lack of bleeding's proximal control from inside the wound, in order to repair the vessel, a midline sternotomy was done. After clamping the brachiocephalic trunk in the pericardial region the bleeding was lessened and fully separated CCA at its origin from the brachiocephalic trunk bifurcation was found. The blood flow was immediately restored using a temporary Burbank carotid shunt (Bard Peripheral Vascular, Tempe, AZ, USA). The shunt was secured to avoid its migration complication[4]. An end-to-side direct anatomic replantation was performed using polypropylene monofilament 6-0 suture after vessels' debridement. The shunt was removed and no bleeding nor thrill in both CCA and subclavian artery were found. The patient had no neurological impairment neither immediately after surgery nor in subsequent days. In two-day period of time no significant ischemic brain lesion nor greater anastomotic-site complication were visible on brain magnetic resonance (MR) and CT angiography (MSCTA).

DISCUSSION

Major vascular trauma is usually found in military cases or in civilian casualties after penetrating neck injuries or blunt trauma[1-3,5,6]. Iatrogenic major injuries are of minimal numbers. In this patient, there was a surgically very hostile neck due to previous surgeries and radioactive iodine chemotherapy. In circumstances like this, a vascular injury is more likely to occur. The major issue was the lack of proximal vascular control from inside the wound because the abruption was at the origin of the right CCA itself. In this situation the first-choice treatment was manual compression of the abruptly bleeding artery, causing in this manner a complete interruption of the blood-flow through the major brain artery with a high possibility of the iatrogenic stroke development. The median sternotomy was performed very shortly afterwards to gain the proximal control of the bleeding and immediately after that the blood-flow was established to the brain using a temporary carotid shunt which must be fastened and secured not to migrate and cause another injury and complication. The spent time from the injury until the blood-flow restitution is crucial. In this case, all of this was done in a relatively short period of time, but previous to the injury no Heparin was administered, and due to the active bleeding, neither Heparin was given during the reconstruction of the CCA. These situations are very prone to clotting and it would be expected in most of the cases for patient to have an intra-

operative stroke almost inevitably. To lessen this possibility the only option which anaesthesiologist has, was to maintain the patient's systolic blood pressure over 160 mmHg during the time of no-flow in the injured CCA in order to get a sufficient blood-supply trough the contralateral, left, carotid artery and administration of Mannitol in order to prevent a brain injury, not knowing whether this would be sufficient because no carotid and brain MSCTA was done preoperatively and therefore no information of the state the other carotid and vertebral arteries and circle of Willis were.

After the direct anatomic surgical reconstruction was done and the shunt was removed, there were no signs of anastomosis site-related complications. The patient woke up in the intensive care unit with no neurologic deficit. In two days the patient underwent a brain MR and carotid and brain MSCTA, both of which showed no serious complication.

CONCLUSION

The patient's young age are of unknown influence to the positive outcome. In hostile neck situations all the major vessels in operative field should all and always be prepared for clamping. Otherwise, a sternotomy for right CCA injury or posterolateral thoracotomy for the left CCA injury are the access-sites of choice for proximal vessel control. Here, the time is the surgeon's severe opponent, and time-consumption must obligatory be reduced to a minimum. All surgeon's decisions must be accurate and prompt because any delay leads to the irreparable brain-damage. A prompt blood-flow restitution using a temporary vascular shunt is of utmost importance in brain-injury prevention and it is the only tool to gain sufficient time for an accurate vascular reconstruction. Higher blood pressure maintaining during CCA occlusion and Mannitol administration are the most important drug-related measures for brain preservation in the situation with no Heparin administration. Most importantly, a quick multidisciplinary team-enrolment of ear-nose-throat, vascular and cardiac surgeon and anaesthesiologist rises the patient's chances to overcome at first futile situation to a complete recovery without any neurological damage.

Conflicts of interest: Authors declare no conflicts of interest.

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