



# **Traumatic Common Carotid Artery Transection: A Case Report of Primary Carotid Artery Repair with Survival and No Neurological Sequelae**

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. Author CCT attended to the case upon referral, did the primary repair along with author CGY continued with post-operative follow-up of the case and wrote the manuscript. Author MAZ supervised the write-up of the case report and served as the supervisor of corresponding author in National University of Malaysia. Author CGY is the chief operating general surgeon for the case and co-author of the case write-up. All authors read and approved the final manuscript.*

**Case Report**

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## **ABSTRACT**

Total transection of Common Carotid Artery is an uncommon surgical emergency in Malaysia. Although uncommon, it is frequently associated with significant neurological morbidity despite prompt successful repair and also associated with high mortality. It remained a challenge to all managing general surgeon around the country in area where vascular surgeon is hard to come by. We present a case of traumatic common carotid artery transection with extended hours of compromised ipsilateral carotid-cerebral blood flow, but adequacy of contralateral carotid flow and intact Circle of Willis during intraoperative assessment, underwent a primary transected carotid artery repair in the event of attempted murder and successful outcome without any neurological sequelae. This case study highlighted the importance of contralateral carotid inflow pairing with an intact Circle of Willis in determining patient's neurological outcome for ipsilateral carotid artery transection, multidisciplinary approach for vascular injury in neck trauma, and close post-operative follow up.

**Keywords:** *Common carotid artery transection; common carotid artery injury; common carotid artery repair; circle of willis; neck trauma; neck vascular injury.*

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## 1. INTRODUCTION

Total transection of common carotid artery is a rare presentation in patient with mid cervical trauma. In Malaysia, owing to the relative socioeconomic stability, low crime rate and absence of legal gun trade, traumatic mid cervical injury with associated common carotid artery transection is rarely encountered. Owing to its rarity, the management when one encounters such case posed a challenge to all practising general surgeon around the country.

Literature search revealed injuries to the carotid arteries constitute a particularly challenging subset of arterial trauma, because they have the potential to produce exsanguinating hemorrhage and debilitating cerebral damage [1].

Common believe was that in the event of unilateral carotid artery injury, perfusion to the ipsilateral cerebral hemisphere would be compromised. However, an intact contralateral carotid artery and Circle of Willis would be able to continue the vascular supply of oxygenated blood to the cerebrum and preventing onset of stroke in such patient. Evidences from previous study such as the one by Peter et al in 1997 indicated that only 4.6% (9/192 sample) developed cerebral ischemia after carotid cross-clamping. Importantly, this study also reported that in patient with contralateral carotid stenosis/occlusion, the incidence of cerebral ischemia is as high as 20% [2].

We present our experience in managing a case of traumatic common carotid artery transection with primary repair in the event of attempted murder and successful outcome without any neurological sequelae.

## 2. CASE REPORT

A 50 year old gentleman was brought in to the Emergency and Trauma Department (ETD) on a hectic night in mid February 2021, with a deep laceration wound over the right anterior neck after attack by unknown assailant. Patient has no known premonitory. Upon arrival in ETD, his hemodynamic was unstable with hypotension and tachycardia, and poor oxygen saturation. Swift endotracheal intubation was carried out by ETD resuscitation team with the help of attending anaesthetic colleague. Local pressure compression was done with gauze packing of laceration wound and bandaging. Fluid resuscitation was carried out and his

hemodynamic was brought back to normal range after 3 unit of crystalloid and 2 unit of pack cells transfusion. He was referred and immediately attended by the Otorhinolaryngology (ORL) unit, which decided that he will need an emergent exploration of the neck laceration for potential airway and neurovascular injuries. The need of concurrent surgical/vascular referral was overlooked in the chaos of immediate exploration, and patient was wheeled to the trauma operating room after transient optimization.

Wound exploration was done by ORL team with extension of the laceration wound, and evacuation of clots. Devitalised tissue was debrided and an active spurter was identified and clamped with Bulldog vascular clamp. ORL team initially attempted repair of the transected vessel but to no avail.

General surgical team was referred on table by ORL team at clamp time of almost 2 hours, and more than at least 5 hours since time of injury. Upon attending and detail anatomical delineation, we realised the clamped bleeder was a transected right Common Carotid Artery (CCA). Reassessment of the condition of the vessel revealed no lost in length. A quick assessment of patient papillary response intra-operatively that shows no unequal pupils, and presents of retrograde spurting flow upon unclamping of cranial segment of the transected CCA indicated the high possibility of a patent contralateral CCA and functioning Circle of Willis aiding the perfusion of affected side's cerebral hemisphere. Decision was made for primary repair of the transected CCA. The repair was done with Optilene 6/0 continuous parachute technique. Prior to final closure and knotting of anastomosis, proximal/caudal clamp release and run-off was allowed to prevent entrapment and cranial embolism of air bubble. After ensuring no anastomotic leakage, a thorough debridement of surrounding devitalized tissue was done, and wound closed primarily with a 12Fr RadiVac drain inserted for early detection of reactionary bleed.

Post-operatively, patient was kept ventilated overnight with anticipation for airway oedema, then extubated the following day after a successful leak test. His neck was immobilized with a cervical collar. Patient was started on daily dose of Aspirin. Daily drain yield minimal serous fluid. After 3 days of close observation in ward, the drain and cervical collar was off. Wound

inspection showed no sign of surgical site infection. Patient made a full recovery and detail examination shows no neurological deficit. Patient was allowed discharge with a weekly follow up. Formal ultrasound Doppler examination of both carotids at 1 month post-event showed no luminal narrowing, dampening of waveform, nor intraluminal thrombus.

### 3. DISCUSSION

In the event of neck trauma, aerovascular injuries need to be anticipated [3]. A high index of suspicion is important, and early referral to related team including Surgical/vascular, Otorhinolaryngologist, and Anesthetist is required for prompt multidisciplinary action for a better outcome.

The adequacy of contralateral carotid flow and intact Circle of Willis is a crucial determining factor in predicting patient's neurological outcome in the event of unilateral carotid arterial occlusion/compromise [4]. This case greatly demonstrated this importance as the ipsilateral blood supply was compromised for an extended hours until it was repaired at more than 5 hours since the time of injury.

This case also highlighted the need of clinical acumen pair with good surgical technique in the event of encounter with traumatic carotid injury in a non-vascular center. With adequate vessel length allowing tension-free anastomosis, primary repair can prove positive outcome for such patient [5]. Post-operative immobilization of neck aid in ensuring no distraction force being applied to the repair site.

Close post-operative follow-up in these patients can allow early detection of delayed complication such as carotid artery stenosis. A surveillance Doppler ultrasonogram or Magnetic Resonance Angiography is useful for the assessment [6]. In the event of any stenosis detected, arrangement can be done with intervention radiologist for stenting of the disease vessel to ensure the patency thus maintaining the vascular supply of ipsilateral cranial end.

### 4. CONCLUSION

In the event of an ipsilateral carotid arterial injury, one of the important factors in determining patient's neurological outcome is the adequacy of the contralateral carotid inflow pairing with an

intact Circle of Willis. Multidisciplinary team approach is required for swift decision making and immediate intervention, which will translate into a better patient outcome. Close follow-up on complex case like this is important for early detection of post-operative complications, so that further intervention can be employed if required.

### CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

### ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

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### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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