

РЕДКОЕ КЛИНИЧЕСКОЕ НАБЛЮДЕНИЕ: МНОЖЕСТВЕННЫЕ ПСЕВДОАНЕВРИЗМЫ ВНУТРЕННЕЙ СОННОЙ АРТЕРИИ И ИПСИЛАТЕРАЛЬНАЯ КАРОТИДНО-КАВЕРНОЗНАЯ ФИСТУЛА, РАЗВИВШИЕСЯ В РЕЗУЛЬТАТЕ ТРАВМЫ ГОЛОВЫ

I. Bishnoi¹, A. Jagetia², P. Kumar², D. Sachdeva²

¹Maharaja Agrasen Medical College; Agroha 125047, Haryana, India;

²Govind Ballabh Pant Hospital; 1 Jawaharlal Nehru Marg, 64 Khamba, Raj Ghat, New Delhi, Delhi 110002, India

Контакты: Anita Jagetia anitajagetia@gmail.com

Каротидно-кавернозные соустья обычно развиваются в результате травмы головы. Они могут быть ассоциированы с аневризмами, чаще всего с внутрикавернозной аневризмой внутренней сонной артерии, реже – с аневризмами иной локализации. Лечение таких фистул осложняется при наличии аневризмы. В подобных случаях эти дефекты могут быть устранены с помощью эндоваскулярного койлинга со стентированием или без него. Лечение еще более усложняется, если аневризма и каротидно-кавернозные фистулы находятся в шейном сегменте внутренней сонной артерии. При такой локализации решение о том, что оперировать в первую очередь, принимается лечащим врачом. В данной статье приводится описание одного из редчайших случаев посттравматических псевдоаневризм шейного сегмента внутренней сонной артерии в сочетании с каротидно-кавернозной фистулой после тупой травмы головы и шеи, а также рассматриваются возможные стратегии лечения.

Ключевые слова: псевдоаневризма, каротидно-кавернозная фистула, койлинг

Для цитирования: Bishnoi I., Jagetia A., Kumar P., Sachdeva D. Редкое клиническое наблюдение: множественные псевдоаневризмы внутренней сонной артерии и ипсилатеральная каротидно-кавернозная фистула, развившиеся в результате травмы головы. Нейрохирургия 2022;24(1):79–82. (На англ.). DOI: 10.17650/1683-3295-2022-24-1-79-82.

A rare case report of trauma manifesting as multiple pseudoaneurysms of internal carotid artery and ipsilateral carotid cavernous fistula

I. Bishnoi¹, A. Jagetia², P. Kumar², D. Sachdeva²

¹Maharaja Agrasen Medical College; Agroha 125047, Haryana, India;

²Govind Ballabh Pant Hospital; 1 Jawaharlal Nehru Marg, 64 Khamba, Raj Ghat, New Delhi, Delhi 110002, India

Contacts: Anita Jagetia anitajagetia@gmail.com

Carotid cavernous fistula is commonly caused by head trauma. Carotid cavernous fistula may be associated with intra-cavernous aneurysm of internal carotid artery, but occurrence of aneurysm at other site is rare. Management becomes complicated when carotid cavernous fistula is associated with aneurysm. Carotid cavernous fistula and aneurysm are managed by endovascular coiling with or without stenting. The management is more complicated if aneurysm is in cervical internal carotid artery along with carotid cavernous fistula. The decision to first obliterate what varies according to patient and doctor. We are reporting one of the rarest case of post-traumatic cervical internal carotid artery pseudoaneurysms with carotid cavernous fistula following blunt head-neck injury and evidence based management strategies in such cases.

Key words: pseudoaneurysm, carotid cavernous fistula, coiling

For citation: Bishnoi I., Jagetia A., Kumar P., Sachdeva D. A rare case report of trauma manifesting as multiple pseudoaneurysms of internal carotid artery and ipsilateral carotid cavernous fistula. *Neyrokhirurgiya = Russian Journal of Neurosurgery* 2022;24(1):79–82. DOI: 10.17650/1683-3295-2022-24-1-79-82.

INTRODUCTION

Traumatic carotid cavernous fistula (CCF) is a common cerebrovascular injury requiring endovascular treatment, but its co-existence with traumatic cerebral pseudo-aneurysms of the cervical internal carotid artery (ICA) is rare [1]. Traumatic CCF is usually detected early due to its symptomatic presentation contrary to asymptomatic presentation of medium and small sized pseudo-aneurysms of cervical ICA [2]. Carotid cavernous fistula can cause pulsatile proptosis, chemosis, conjunctival congestion, vision loss and/or ophthalmoplegia.

Internal carotid artery dissection or pseudoaneurysm commonly occurs at petrous or cavernous segment [3]. Dissection in cervical ICA is rare due to long mobile arterial segment, which can compensate traumatic force. Less than twenty cases of a CCF with coexistence of ICA aneurysm have been reported [3]. We are reporting about management of a unique case of post-traumatic CCF along with two pseudo-aneurysms of cervical ICA and discuss review of literature.

Case report. A 26-years old man who had past history of evacuation of left side a acute subdural hematoma with frontal lobe contusion following motor vehicle accident 6 months ago, presented with complaints of chemosis, proptosis and decreased vision in left eye. He had audible bruit over the left eye with visual acuity of 6/9 in the same eye with no other cranial nerve palsy (fig. 1).

Computed tomography (CT) orbit brain showed fracture of medial and lateral walls of left orbit. Digital subtraction angiography (DSA) and CT angiography of six vessels showed left sided Barrow's Type A – CCF (fig. 2a–b), fistulous communication between inferior wall of cavernous ICA and anterior part of cavernous sinus, and two pseudo-aneurysms arising from left cervical ICA.

The proximal was smaller and distal was larger (size 1.35×1.58 cm) (fig. 3a–c). The flow in ICA, distal to fistula, was severely impaired and showing no filling. There was sufficient cross flow from opposite ICA. After informed consent, patient underwent treatment of CCF prior to management of pseudoaneurysms. Transarterial route was taken



Fig. 1. Left proptosis, conjunctival edema (arrow head), congestion (a); almost complete recovery in same eye after coiling of carotid cavernous fistula (b)

Рис. 1. Проптоз слева, отек конъюнктивы (стрелка) и гиперемия (a); практически полное восстановление после койлинга каротидно-кавернозной фистулы (b)

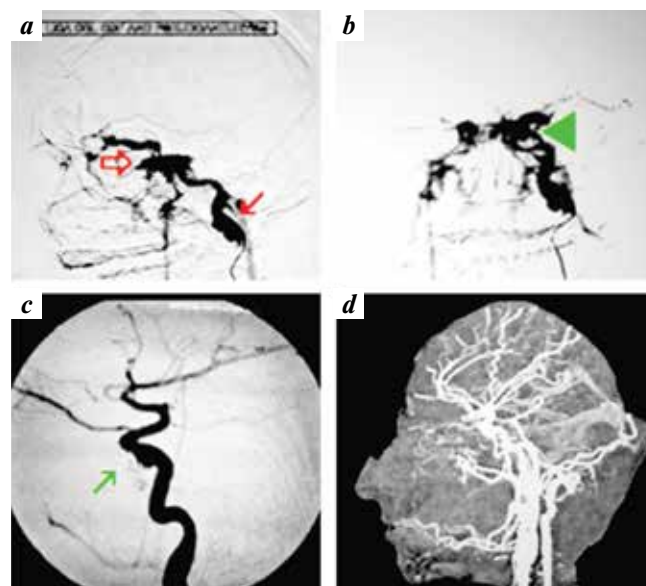


Fig. 2. Depicting DSA lateral view showing two pseudoaneurysms (arrows) arising from cervical internal carotid artery, carotid cavernous fistula (a); depicting DSA AP view showing carotid cavernous fistula (arrow head) with bilateral cavernous sinus filling (b); depicting DSA lateral view of internal carotid artery following carotid cavernous fistula coiling and pseudo-aneurysm stenting (oblique arrow), showing distal flow in branches (c); depicting CT angiography lateral view after complete treatment, showing complete recovery (d)

Рис. 2. Цифровая субтракционная ангиография — боковая проекция: две псевдоаневризмы (стрелки) и каротидно-кавернозная фистула в шейном отделе внутренней сонной артерии (a); фронтальная проекция: каротидно-кавернозная фистула (стрелка) с заполнением кавернозного синуса с обеих сторон (b); боковая проекция: внутренняя сонная артерия после койлинга каротидно-кавернозной фистулы и стентирования псевдоаневризм (стрелка), виден поток в дистальных ветвях (c); боковая проекция: полное восстановление после курса лечения (d)

through right femoral artery and the fistulous communication was obliterated using coils. Complete obliteration was confirmed on postoperative DSA (fig. 2c) and CT angiography (fig. 2d).

During follow up period of 3 months, patient was not given any anticoagulants. After 3 months following CCF treatment, repeat DSA was done to assess the stability of fistulous closure and status of pseudo-aneurysms. It showed stable closure of fistula and same sized pseudo-aneurysms. Patient was put on clopidogrel (75 mg) and aspirin (150 mg) one week before treatment of pseudo-aneurysms. A covered carotid stent (Abbot™) of size 8×70 mm was deployed in cervical ICA obliterating both pseudoaneurysms. Postoperative DSA showed complete obliteration of both pseudo-aneurysms and CCF (fig. 3d).

Patient was discharged on 2nd day after full recovery. His eye symptoms subsided completely. He was followed up after 3, 6, 12 and 24 months, patient had no signs of recurrence of CCF (fig. 1b).

DISCUSSION

Vascular injuries occur in 25 % of carefully screened patients with head, face and neck trauma [4, 5]. Incidence

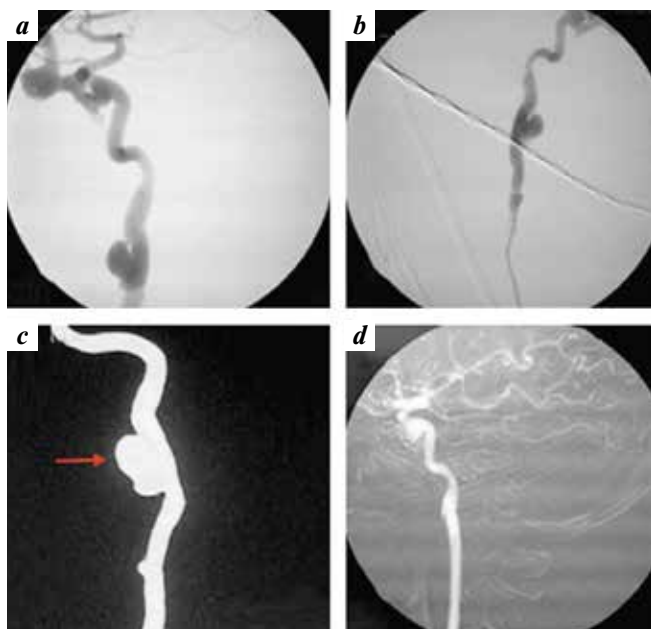


Fig. 3. *Depicting DSA lateral, oblique lateral views (a, b, c) showing internal carotid artery pseudoaneurysms (arrow – c); depicting CT angiography post stenting, showing complete disappearance of pseudoaneurysms (d)*

Рис. 3. Цифровая субтракционная ангиография — боковая и косая боковая проекции (a, b, c): псевдоаневризмы внутренней сонной артерии (стрелка на рис. c); компьютерная ангиография после стентирования: полное удаление псевдоаневризм (d)

of traumatic intracranial aneurysms is rare and accounts for less than 1 % of intracranial aneurysms [6, 7].

The concomitant appearance of traumatic ICA pseudoaneurysms with CCF following head injury is very rare and no case of such triple pathology has been reported in searched literature. This kind of injury perhaps must have happened following sudden severe movement of neck and head. Rapid acceleration and deceleration of neck against bony structures of the neck must have caused pseudo-aneurysms of cervical ICA as is mentioned in the previous similar kinds of report [8, 9]. The case reports have mostly mentioned about pseudoaneurysm formation in cavernous ICA segment. In cervical ICA, pseudoaneurysm formation is uncommon by blunt force.

As cervical ICA pseudoaneurysm is uncommon, there are high chances of missing it on routine CT angiography. Missed diagnoses of cervical pseudo-aneurysms may result in life-threatening haemorrhage and (or) present as pulsatile swelling [9].

The different angiographic features of traumatic pseudoaneurysms, which are also considered dangerous, are an irregular shape, delayed filling and emptying of the sac, an orifice which is not located at the common arterial branching points and (or) no visible neck [9].

Cervical ICA pseudoaneurysm is mostly managed by stenting, rarely coil, nactacryl or Onyx-HD embolization due to fragile wall [2, 8, 10–12]. Traditionally aneurysms are given priority over fistulous closure even if they are clinically silent. However in our case, contrary to managing aneurysms first, CCF was managed first. The rationale behind this was that — the wall of the aneurysms was not irregular so they were not considered impending aneurysms to bleed. Secondly the treatment planned for aneurysms was to place a covered stent without coils which was considered safe too because there is no branch in cervical region of ICA. However this would be requiring anticoagulants postoperative which might interfere in thrombosis of fistula added by coiling. Fuse et al. have reported a resembling case scenario in which they operated traumatic CCF first by endovascular coiling followed by contralateral clinoidal ICA aneurysm by trapping [2]. The reason was that, CCF occlusion first confirmed patency of ipsilateral ICA and then trapping of contralateral ICA aneurysm was done so that cross flow from ipsilateral ICA maintained distal flow on contralateral side [2]. The reverse option i. e. aneurysm treatment first with stent and keeping the patient on anti-coagulants followed by fistulous closure by coils could have resulted in unstable thrombosis of fistula due to anticoagulants. It was perhaps planned correctly as the fistulous closure was permanent before treating aneurysms by covering them with stent. This did not result in recurrence of fistula in follow up.

CONCLUSION

While doing digital subtraction angiography, pseudoaneurysms were never anticipated in the cervical internal carotid artery and this could have resulted in inadvertent injury to aneurysms. Therefore any case of head injury presenting with some known vascular injury, should be subjected to doppler study of neck vessels before doing any invasive procedure. It is an economic and reliable test. Endovascular management of traumatic vascular injury is the least invasive and effective method. Sometimes fistulous closure is given priority over aneurysm closure considering the risk and benefit of the available modes of treatment.

ЛИТЕРАТУРА / REFERENCES

1. Tucci J.M., Maitland C.G., Pcsolyar D.W. et al. Carotid-cavernous fistula due to traumatic dissection of the extracranial internal carotid artery. *AJNR* 1984;5(6):828–9.
2. Fuse A., Yokota H., Kominami S., Yamamoto Y. Traumatic cerebral aneurysm associated with a contralateral traumatic carotid cavernous fistula. A case report. *Interv Neuroradiol* 2007;13(3):287–93. DOI: 10.1177/159101990701300309.
3. Teal J.S., Bergeron R.T., Rumbaugh C.L., Segall H.D. Aneurysms of the petrous or cavernous portions of the internal carotid artery associated with non-penetrating head trauma. *J Neurosurg* 1973;38(5):568–74. DOI: 10.3171/jns.1973.38.5.0568.
4. Bromberg W.J., Collier B.C., Diebel L.N. et al. Blunt cerebrovascular injury practice management guidelines: the Eastern Association for the Surgery of Trauma. *J Trauma* 2010;68(2):471–7. DOI: 10.1097/TA.0b013e3181cb43da.
5. Pozzati E., Gaist G., Servadei F. Traumatic aneurysms of the supraclinoid internal carotid artery. *J Neurosurg* 1982;57(3):418–22. DOI: 10.3171/jns.1982.57.3.0418.
6. Salzman M., Botero E., Bellis E. Giant posttraumatic aneurysm of the intracranial carotid artery: Evolution and regression documented by computed tomography. *Neurosurgery* 1985;16(2): 218–21. DOI:10.1227/00006123-198502000-00016.
7. Redekop G.J. Extracranial carotid and vertebral artery dissection: A review. *Can J Neurol Sci* 2008;35(2):146–52. DOI: 10.1017/s0317167100008556.
8. Kraus R.R., Bergstein J.M., DeBord J.R. Diagnosis, treatment, and outcome of blunt carotid arterial injuries. *Am J Surg* 1999;178(3):190–3. DOI: 10.1016/s0002-9610(99)00157-9.
9. Ohta H., Natarajan S.K., Hauck E.F. et al. Endovascular stent therapy for extracranial and intracranial carotid artery dissection: Single-center experience. *J Neurosurg* 2011;115(1):91–100. DOI: 10.3171/2011.1.JNS091806.
10. Jagetia A., Sharma D., Singh D. et al. Endovascular occlusion of cervical internal carotid artery pseudoaneurysm in a child treated by N-butyl cyanoacrylate: A rare case report. *Pediatr Neurosurg* 2015;50(3):168–72. DOI: 10.1159/000381861.
11. Berne J.D., Reuland K.R., Villarreal D.H. et al. Internal carotid artery stenting for blunt carotid artery injuries with an associated pseudoaneurysm. *J Trauma* 2008;64(2):398–405. DOI: 10.1097/TA.0b013e31815eb788.
12. Coldwell D.M., Novak Z., Ryu R.K. et al. Treatment of posttraumatic internal carotid arterial pseudoaneurysms with endovascular stents. *J Trauma* 2000;48(3):470–2. DOI: 10.1097/00005373-200003000-00016.

Вклад авторов

I. Bishnoi: разработка концепции и дизайна исследования, научное редактирование статьи;

A. Jagetia: сбор и обработка материала, написание статьи;

P. Kumar: сбор и обработка материала, написание статьи;

D. Sachdeva: сбор и обработка материала, написание статьи.

Authors' contributions

I. Bishnoi: research idea and design, scientific editing of the article;

A. Jagetia: obtaining data for analysis, article writing;

P. Kumar: obtaining data for analysis, article writing;

D. Sachdeva: obtaining data for analysis, article writing.

ORCID авторов / ORCID of authors

I. Bishnoi: <https://orcid.org/0000-0001-8604-2444>

Конфликт интересов. Авторы заявляют об отсутствии конфликта интересов.

Conflict of interest. The authors declare no conflict of interest.

Финансирование. Исследование проведено без спонсорской поддержки.

Financing. The study was performed without external funding.

Соблюдение прав пациентов и правил биоэтики

Протокол исследования одобрен комитетом по биомедицинской этике. Все пациенты подписали информированное согласие на участие в исследовании и публикацию своих данных.

Compliance with patient rights and principles of bioethics

The study protocol was approved by the biomedical ethics committee. All patients gave written informed consent to participate in the study and to the publication of their data.

Статья поступила: 07.09.2020. **Принята к публикации:** 26.10.2021.

Article submitted: 07.09.2020. **Accepted for publication:** 26.10.2021.