

Received: 2009.09.28
Accepted: 2010.01.06

Facial artery pseudoaneurysm and severe bleeding after tonsillectomy – endovascular treatment with PVA particle embolization

Robert Juszkat¹, Aleksandra Korytowska², Zofia Łukomska², Anna Zarzecka¹

¹ Department of Neuroradiology, Poznań University of Medical Science, Poznań, Poland

² ENT Department, Hospital in Poznań, Poznań, Poland

Author's address: Robert Juszkat, Department of Neuroradiology, Poznań University of Medical Science, Poznań, Poland, e-mail: robertju@wp.pl

Summary

Background:

Tonsillectomy is one of the most common procedures performed in ENT departments. The most common complication is a haemorrhage, which incidence is estimated at 3–3.9% of all procedures.

Case Report:

We present the case of a 32-year-old female with severe bleeding 11 and 23 days after tonsillectomy. An angiography revealed a pseudoaneurysm of the facial artery (FA), a 5 mm in diameter, at the level of tonsillar artery takeoff. The FA was embolized with 500- μ m particles of PVA. The procedure was successful. The patient did not experience further bleeding.

Conclusions:

In rare cases post-tonsillectomy haemorrhage may be caused by the pseudoaneurysm of the facial artery. The endovascular embolization of this condition proved to be a valuable treatment method. It is a safe and permanent treatment option in this potentially life-threatening complication.

Key words:

tonsillectomy • pseudoaneurysm • PVA embolization

PDF file:

<http://www.polradiol.com/fulltxt.php?ICID=878439>

Background

Tonsillectomy is one of the most often performed procedures in ear-nose-throat (ENT) departments [1]. Although many different complications may arise after this procedure, the most common is haemorrhage, which in very rare cases may be fatal [2]. Its incidence is estimated at 3–3.9% [3,4]. Intraoperative (within 24 hours after the procedure) haemorrhage is associated with operative technique and coagulopathy. Delayed haemorrhage (>24 h after the procedure), mostly on the 5th to 7th day, is associated with separation of slough from the granulating fossa [5]. The most severe haemorrhages are due to arterial dissections or pseudoaneurysms [5]. The latter can be caused by blunt or direct trauma during dissection or the placing of ligation sutures [5].

Cases of pseudoaneurysms after tonsillectomy of the lingual, facial and internal carotid artery have been reported [5].

We present the case of a 33-year-old patient with a pseudoaneurysm of the facial artery (FA) and severe bleeding

after tonsillectomy who was treated endovascularly with embolization using PVA particles.

Case Report

A 32-year-old female underwent tonsillectomy due to chronic purulent tonsillitis. The procedure was performed under general anaesthesia. The peri- and postoperative course was uneventful. The patient was discharged the following day. On the 11th day after the procedure, the patient was readmitted urgently to the hospital due to a short-lasting but abrupt haemorrhage from the pharynx. She had no signs of bleeding on admission.

The patient's haemoglobin level dropped significantly to 6.9 g/dL. The coagulation values were within the normal range. The patient was transfused with 2 units of packed red blood cells and discharged after 7 days in good general condition with no signs of bleeding. On the 23rd day after the procedure, the patient experienced a small bleed from the left tonsillar bed. On admission, no manifestations of haemorrhage were noted, however, a sugillation in the left linguo-tonsillar

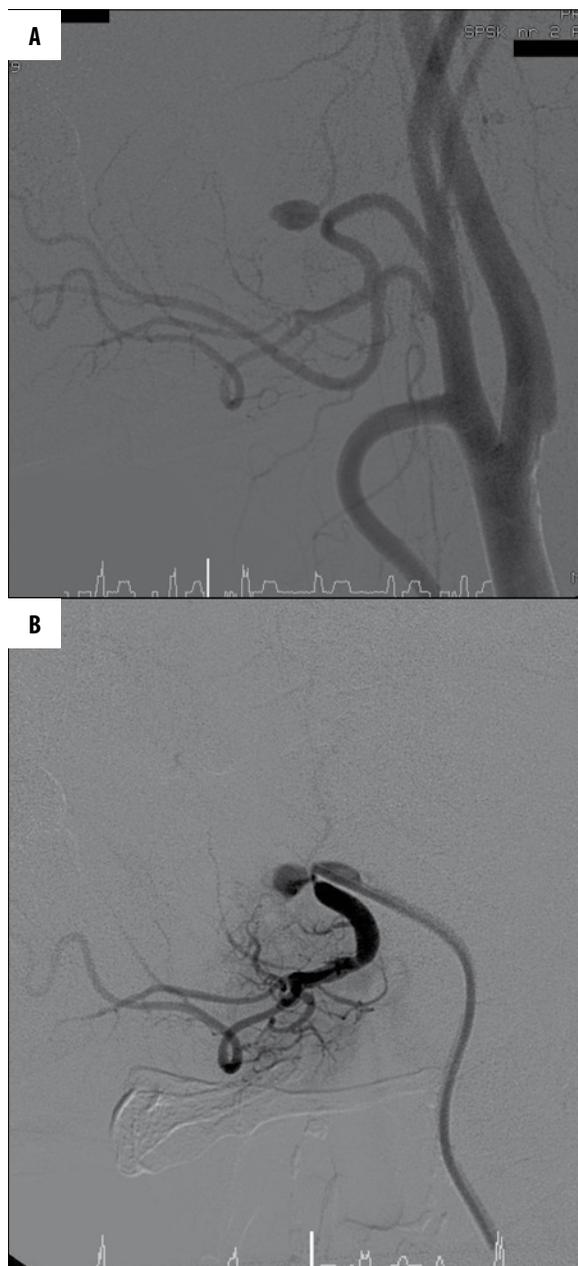


Figure 1. Digital subtraction angiography (DSA). Selective angiography of the left common carotid artery (A) and the facial artery (B). Pseudoaneurysm of the facial artery at the level of the tonsillar branch takeoff.

angle was visible. Suddenly, without any prodromal signs, severe bleeding began from the mouth. The patient's throat was immediately examined under general anaesthesia and the vessels in the lateral wall of the pharynx, inferior to the left lower pole of the tonsil, were electrocauterized. The patient was transfused with another 3 units of packed red blood cells. The patient's condition improved. A decision was made to perform angiography of the left external carotid artery with subsequent embolization of the bleeding vessel. The angiographic examination was performed using a Headhunter (Balton, Warsaw, Poland) catheter, and selective catheterization of the common carotid and next external carotid artery was carried out. The angiography revealed



Figure 2. DSA. Selective angiography of the left common carotid artery after complete embolization of the facial artery with PVA particle.

a 5-mm pseudoaneurysm of the FA, at the level of tonsillar branch takeoff (Figure 1A,B). Embolization of the FA was performed with the application of 50 mg of PVA embolization material with a particle size of 500 μm . The procedure was continued until the main trunk was completely closed (Figure 2). The decision to use 500- μm particles was based on the fact that we wanted to embolize the main facial trunk and not only its terminal branches. This would enable building of the collateral circulation and prevent mucosal necrosis caused by the embolization of the feeding vessels from the FA.

After the procedure, control DSA was performed. It revealed complete occlusion of the FA. The postoperative course was uneventful. The patient was discharged in a good general condition. No further haemorrhages were noted during the 6-month follow-up.

Discussion

Haemorrhage is the most common of all complications of tonsillectomy, with an estimated incidence of 3–3.9% [3,4]. Its occurrence increases with age, peaking at 30–34 years with no difference between males and females. The incidence of serious haemorrhage increases in the older age categories [6]. Delayed bleeding usually occurs between days 5 and 10 postoperatively as a result of premature separation of the eschar, leading to retraction of small surface vessels and overlying clot formation [7,8].

Damage to an arterial wall may result in pseudoaneurysm formation and subsequent bleeding [9]. In the case of tonsillectomy, such damage may be a corollary of dissection or placing sutures during tonsillectomy [5]. As an after-effect of normal arterial pressure, luminal blood leaks out

through the damaged arterial wall into the surrounding soft tissues and forms a pseudoaneurysm sac that communicates directly to the arterial lumen [9].

Aberrant blood supply to a tonsil may pose a risk of iatrogenic pseudoaneurysm in the tonsillar bed. The blood supply of palatine tonsils comes from the descending palatine artery (branch of the internal maxillary artery), the ascending pharyngeal artery, the dorsal lingual artery (branch of the lingual artery) and the ascending palatine artery and tonsillar artery, both originating from the FA [2,10]. The variable course of the FA looping high over the submandibular gland and approaching the posteroinferior tonsillar pole makes that area vulnerable for arterial injury [11–13]. Sporadically, the FA or even the lingual artery may have an upward course and come close to the inferior tonsillar pole [13,14].

In our case, angiography did not reveal an aberrant course of the FA, and therefore surgical manipulations in the tonsillar fossa may have caused the injury to the FA at the level of the tonsillar artery origin. Angiography is pivotal in evaluation of the tonsillar blood supply and detection of possible aberrant courses of vessels. It plays an invaluable role in avoiding the possible disastrous complications of surgical manipulation in the surgical treatment of bleeding.

The vast majority of cases of pseudoaneurysms after tonsillectomy have concerned the lingual artery [1,2,5,13]. Single cases of a pseudoaneurysm of the external carotid artery have also been described [15,16]. To our knowledge, this is the second reported case of a FA pseudoaneurysm secondary to tonsillectomy [17]. In the first reported case, the pseudoaneurysm was caused by deep vessel ligation in the tonsillar bed.

Repeated episodes of bleeding should be considered as a warning sign of serious post-tonsillectomy haemorrhage. In the presented case, the first bleeding episode occurred on the 11th postoperative day and then on day 23. No masses were observed on oral inspection at any time. Van Crujjsen proposed an explanation for such a sequence of events. The aneurysm develops gradually, expanding when the periarterial clot dissolves and more blood flows outside the vessel [5,18]. He also suggested that the size of the lesion to the vessel wall might determine the volume of blood and whether the aneurysm is large enough to be visible. In our case, the lesion may have been small, which might have made the pseudoaneurysm grow slowly. Without any provoking events, lying down in bed might have increased

blood pressure in the carotid artery with subsequent leakage from the aneurysm. A new clot would have made the severe short-lasting bleeding stop [5].

The treatment options for post-tonsillectomy haemorrhage include surgical ligation and endovascular embolization of the bleeding vessels. The first method carries a risk of injury to the superior laryngeal or vagus nerve, cerebrovascular accident and diminished vascular reserve in the arterial distribution of the vessels ligated [13]. Moreover, serious bleeding may not stop after ligation of the external carotid artery or other arterial branches [2,11].

Endovascular treatment of PTH has three main advantages: first, the diagnostic evaluation can be combined with direct therapeutic intervention; second, embolization is more selective; and third, this method is less mutilating and has less risk of damaging the vagal and accessory nerves [4]. The materials available for use in endovascular treatment in the head and neck area include coils, PVA particles and gelatin sponges [2].

The thorough evaluation of the obtained angiograms of the external carotid artery and its branches is a prerequisite for a successful procedure. First, the site of arterial injury is detected. Second, it allows for elucidating potentially dangerous anastomoses between the external carotid artery and internal carotid artery [2]. In the case of the FA, such anastomoses can exist from the angulonasal artery via the nasal artery to the ophthalmic artery and from the anguloorbital artery via the inferior palpebral artery and nasal artery, both to the ophthalmic artery [19]. The possible existence of anastomoses determines the diameters of the particles applied. We used PVA particles of 500 μm in size. In our opinion this diameter is optimal, as it will not cause mucosal necrosis, damage to adjacent structures and certainly will not embolize the ophthalmic artery via the anastomoses. However, Opatowsky et al. advised the use of 150 μm PVA in such cases [2].

Conclusions

1. In rare cases post-tonsillectomy haemorrhage may be caused by the pseudoaneurysm of the facial artery.
2. The endovascular embolization of this condition proved to be a valuable treatment method. It is a safe and permanent treatment option in this potentially life-threatening complication.

References:

1. Menauer F, Suckfull M, Stabler A et al: Pseudoaneurysm of the lingual artery after tonsillectomy. A rare complication. *Laryngorhinootologie*, 1999; 78: 405–7
2. Opatowsky MJ, Browne JD, McGuirt WF Jr: Endovascular treatment of hemorrhage after tonsillectomy in children. *AJNR Am J Neuroradiol*, 2001; 22: 713–16
3. Weber R, Keerl R, Hendus J et al: The emergency: traumatic aneurysm in the area of the head-neck. *Laryngorhinootologie*, 1993; 72: 86–90
4. Kendrick D, Gibbin K: An audit of the complications of paediatric tonsillectomy, adenoidectomy and adenotonsillectomy. *Clin Otolaryngol Allied Sc*, 1993; 18: 115–17
5. van Crujjsen N, Gravendeel J, Dikkers FG: Severe delayed post-tonsillectomy haemorrhage due to a pseudoaneurysm of the lingual artery. *Eur Arch Otorhinolaryngol*, 2008; 265: 115–17
6. Alexander RJ, Kukreja R, Ford GR: Secondary post-tonsillectomy haemorrhage and informed consent. *J Laryngol Otol*, 2004; 118: 937–40
7. Adams GL, Boies LR Jr, Hilger PA: Boies Fundamentals of Otolaryngology: A textbook of ear, nose, and throat diseases, 6th ed. WB Saunders, Philadelphia, 1989
8. Johnson LB, Telluru RG, Myer CH: Complications of adenotonsillectomy. *Laryngoscope*, 2002; 112: 35–36

9. Keeling AN, Naughton PA, Leahy AL et al: Traumatic inferior gluteal artery pseudoaneurysm and arteriovenous fistula managed with emergency transcatheter embolization. *Cardiovasc Intervent Radiol*, 2008; 31(Suppl.2): 135-39
10. Bochenek A, Reicher M: *Anatomia człowieka*. 8th ed., Warszawa, 1998; 3; 117
11. Gardner JF: Sutures and disasters in tonsillectomy. *Arch Otolaryngol*, 1968; 88: 117-21
12. Nathan MD, Sessions DG: Massive post-tonsillectomy hemorrhage. *South Med J*, 1981; 74: 1153-56
13. Simoni P, Bello JA, Kent B: Pseudoaneurysm of the lingual artery secondary to tonsillectomy treated with selective embolization. *Int J Ped Otorhinolaryngol*, 2001; 59: 125-28
14. Hollinshead, WH: Head and neck. In: *Anatomy for surgeons*. Harper & Row, New York, 1968; 1: 448-49
15. Karas DE, Sawin RS, Sie KC: Pseudoaneurysm of the external carotid artery after tonsillectomy. A rare complication. *Arch Otolaryngol Head Neck Surg*, 1997; 123: 345-47
16. Pourhassan S, Grottemeyer D, Fokou M et al: Extracranial carotid arteries aneurysms in children: single-center experiences in 4 patients and review of the literature. *J Pediatr Surg*, 2007; 42: 1961-68
17. Weber R, Keler R, Kahle G: Der Notfall: das traumatische aneurysma im kopf-hals-bereich. *Laryngo-Rhino-Otol*, 1993; 72: 86-90
18. Defatta RJ, Verret DJ, Bauer P: Extracranial internal carotid artery pseudoaneurysm. *Int J Pediatr Otorhinolaryngol*, 2005; 69: 1135-39
19. Lasjaunias P, Berenstein A, ter Brugge K: *Surgical neuroangiography. Clinical vascular anatomy and variations*. Vol 1, 2nd edn. Springer, Berlin, Heidelberg, New York, 2001; 479-629