Management of Late Post-traumatic Facial Artery Pseudoaneurysmal Cyst: Review of Literature

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Abstract Pseudoaneurysms of the branches of the external carotid artery as a result of trauma are rare in oral and maxillofacial surgery practice. The most affected branches are the superficial temporal artery, internal maxillary artery and distal part of facial artery, usually where they pass over the bone. Very few cases of facial artery pseudoaneurysms of proximal parts (from external carotid artery up to the lower border of the mandible) are reported in the literature. We present a review of literature for management of late post-traumatic pseudoaneurysmal cyst and a case report involving proximal part of facial artery in the submandibular region following open reduction and rigid fixation of the condylar fracture in a 25-year-old male. To our knowledge this is the fourth reported case of proximal facial artery pseudoaneurysm.

Keywords Pseudoaneurysm · Facial artery · Sclerotherapy for pseudoaneurysm

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Introduction

A pseudoaneurysm or false aneurysm is leakage of blood through disrupted arterial wall into the adjacent tissue with a persistent communication between them. True aneurysms are actual dilations of the intact vessel wall without leakage. A pseudoaneurysm is most often the result of blunt trauma and presents several days or weeks after the injury [1]. Predisposing factors include infection, radiotherapy, poor nutrition and malignancy [2, 3]. Pulsatile swelling, pain, associated palpable thrill, audible bruit, or unexplained neurological deficits are common physical findings.

Pseudoaneurysms of the branches of the external carotid artery (ECA) are rare as they are in deep, protected locations. Hence trauma usually results in total transection rather than partial laceration. The most affected branches are the superficial temporal artery, internal maxillary artery and distal part of the facial artery, usually where they pass over the bone [4] and become more vulnerable to blunt or penetrating trauma.

We present a review of literature for management of late post-traumatic pseudoaneurysmal cyst and a case report involving proximal part of facial artery in the submandibular region. To our knowledge this is the fourth reported case involving proximal part of facial artery.

Case Report

A 25-year-old male presented to us with a swelling in the left preauricular region following open reduction and rigid internal fixation (ORIF) for condylar fracture at local hospital. After unremarkable initial recovery period of 2 weeks, he developed this progressively growing swelling associated with dysphagia, mild dyspnoea and inability to

Fig. 1 Front view showing extent of swelling and weakness of frontal branches of facial nerve

close his left eye. Clinically, a large, tense, ill defined swelling measuring 6 cm × 6 cm was seen over cheek extending from ala-tragus line to inferior border of mandible superoinferiorly and from modiolus to mastoid region anteroposteriorly (Fig. 1). Pulsations were felt only in the centre of the lesion and surface temperature was raised. A bluish black lumpy swelling was seen protruding in the external acoustic meatus. Left lower motor neuron facial palsy involving all the branches predominantly affecting the frontal and zygomatic branches was present. Air conduction in the left ear was absent but bone conduction was intact. Intraorally, the uvula was deviated to the right side. Aspiration showed presence of blood in central part of the lesion and post aspiration, there was no continuous bleeding.

Colour doppler revealed a well defined cystic lesion posterior to the angle of the mandible highly suggestive of a pseudoaneurysm. Turbulent flow was noted in the patent lumen of the thrombus. The computed tomography (CT) images revealed a large pseudoaneurysm extending from the carotid bifurcation inferiorly to the base of the skull superiorly measuring 6 cm × 7 cm obliterating the left parapharyngeal space and the masseter muscle (Fig. 2). Peripheral thrombosis of the lesion could be appreciated. The internal jugular vein and common carotid artery on the right side appeared normal. The exact origin of the lesion could not be evaluated on CT scan images. Digital Subtraction Angiography (DSA) confirmed the nature of lesion (Figs. 3, 4) and identified proximal part of facial artery to be the origin of the pseudoaneurysm. The branches of the left external carotid artery appeared to be stretched, splayed and draping around the mass of the aneurysm. Ipsilateral internal maxillary artery was thrombosed in the middle segment and filling of the distal segment was seen

Fig. 2 CT revealed a large pseudoaneurysm extending from the carotid bifurcation inferiorly up to the base of the skull

Fig. 3 Digital subtraction angiography (DSA) showing branches of the left external carotid artery appearing to be stretched, splayed and draped around the mass of the aneurysm

via the collateral supply given by the branches of the left lingual artery. The left internal carotid artery showed normal caliber, contour and branching pattern in its intracranial course.

The lesion was very superficial and the risk of uncontrolled bleeding was minimal, intralesional sclerotherapy was planned to alleviate the patient's symptoms. Two ml of 3 % Sodium Tetradecyl Sulphate was injected intralesional under local anesthesia. A total of fifteen injections were given every alternate day over a period of 30 days. There was mild tissue irritation and subsequent abscess formation in the submandibular space which was managed with incision and drainage. All signs and symptoms were alleviated following sclerotherapy. The facial palsy improved over a period of 3 months. The patient was asymptomatic at 12 months follow-up (Fig. 5).

Fig. 4 Digital subtraction angiography (DSA) showing thrombosed ipsilateral internal maxillary artery in the middle segment

Fig. 5 Post-treatment front view showing regression of swelling and improved facial nerve weakness

Literature Scan and Discussion

Pseudoaneurysms of facial artery usually arise from the distal part of the vessel (from the lower border of the mandible up to the medial canthal region) where it is vulnerable to trauma as it crosses the mandible [4–8]. Very few cases of facial artery pseudoaneurysms of proximal part (from external carotid artery up to the lower border of the mandible) are reported in the literature [9]. Aneurysms of superior and inferior labial arteries are considered extremely rare [10–12].

Aneurysm may be true or pseudo. True aneurysm is a dilation of the intact vessel wall consisting of all three layers namely intima, media and adventitia. Pseudo or false aneurysm, an uncommon consequence of arterial damage, does not have these three layers in its histological picture. It is a rare vascular complication that results from an

incomplete tear of vessel wall causing blood to flow through the laceration into the surrounding tissues resulting in tamponade and clot formation [13]. The arterial flow pressure is incompletely counterbalanced by the adjacent fibrous tissue containing the hematoma. Gradually the size of the mass increases due to the persistent leakage and finally results in pseudoaneurysm [14]. The wall of the pseudoaneurysm consists of perivascular fibrous tissue. The haematoma usually liquefies and communication between artery and aneurysmal sac persists. The time between the injury and clinical presentation of pseudoaneurysm can vary from days to years [13]. If the condition remains undiagnosed, early or late massive postoperative bleeding can occur after surgery in that anatomical territory.

Infection, radiotherapy, poor nutrition, and malignancy are predisposing factors for the development of pseudoaneurysm [2, 3]. The main etiological factors include arteriosclerosis, trauma, infections, cystic medial necrosis, fibromuscular dysplasia and congenital anomalies [15]. In the literature, pseudoaneurysms of the branches of external carotid artery have been reported following tonsillectomy [16], neck dissection [17, 18] and ORIF of a mandibular fracture [19, 20], Le Fort I osteotomies [21, 22], temporomandibular joint surgery [23, 24], and mandibular vertical ramus osteotomy [25]. Majority of reports have described blunt trauma [14, 26, 27] and penetrating injuries [4, 28–30] as the most common etiological factor.

Diagnosis of a pseudoaneurysm is mainly based on clinical examination. Physical findings are pulsatile swelling, pain, associated palpable thrill, audible bruit or unexplained neurological deficits. Pathognomonic presence of pulsatile mass or a typical systolic bruit during auscultation [19]. Needle aspiration of suspicious lesions should be avoided because of the risk of bleeding which may be difficult to control in an office setting [31]. In our case, we aspirated the lesion in hospital setting as it was very superficial. Imaging is important to define the localization and extent of the lesion. Color doppler ultrasonography has been suggested as a screening method by Nadig et al. [18] due to vascular nature. Though contrast enhanced CT defines the dimensions of the lesion and its relation to surrounding structures, but may not clearly show the vascular abnormalities in partially developed pseudoaneurysms. Thus angiography becomes an essential tool to confirm the diagnosis [19]. Differential diagnosis includes hematoma, abscess, inflamed lymph node, lipoma, cyst, and pleomorphic adenoma [31]. The final diagnosis of pseudoaneurysm is made by the pathologist, who can microscopically distinguish true from false aneurysm, depending on the layers of the vessel wall involved [13].

Many different modes of treatment for pseudoaneurysm have been described in the literature. These include

compression of the aneurysm until flow is arrested, embolization of the pseudoaneurysm, and surgery, with excision of the affected portion of the artery [32]. Generically, the mode of treatment may be divided into noninvasive and invasive techniques. Noninvasive modalities include observation and compression. Compression can be achieved with manual pressure or by ultrasound guided compression; both techniques attempt to convert the vascular lesion into a hematoma by accelerating spontaneous thrombosis. The success of this therapy depends on elimination of the blood flow in the pseudoaneurysm sac for 15–30 min [33, 34]. Some studies have shown that as many as 89 % of untreated pseudoaneurysms resolve in 5–90 days [33, 35]. Most of the lesions are known to reduce spontaneously in 5–90 days. In our 40 days old case, sclerotherapy was instituted to manage dysphasia and mild dyspnoea and facial palsy.

Compression can be achieved by placing an ultrasound-Doppler probe over the neck of the pseudoaneurysm until flow is arrested. The success rate of 60–90 % has been reported with this time consuming, and painful method [36]. Treatment of a pseudoaneurysm with invasive techniques include surgical excision [37], percutaneous embolization [38–40], or both [41]. With the development of endovascular techniques, embolization is becoming popular. Materials used for embolization include particles, coils, balloons, or liquids such as cyanoacrylate or alcohol [42, 43].

Percutaneous embolization is performed by direct puncture and injection of thrombin under ultrasound guidance. Method utilizes materials that occlude the vessel, either temporarily or permanently, resulting in conversion of the pseudoaneurysm into a hematoma, which then resorbs over time. Metallic coils, polyvinyl alcohol particles, and absorbable gelatin sponge are the most common embolic agents. Iso-cyanoacrylate and bovine thrombin are used less frequently. Percutaneous embolization is a safe, quick, and effective technique for treatment of pseudoaneurysms. The most important advantage of this technique is the ability to readily reach damaged vessels that are difficult to approach surgically [25, 44, 45].

Dediol et al. [13] advocated the surgical management as a treatment of choice for pseudoaneurysm with signs of local infection. The pseudoaneurysm in our case was located in the retromandibular region in the proximal part of the facial artery and did not show signs of infection. Extension to lateral pharyngeal wall excluded the use of compression. Embolization was not possible due to partially thrombosed nature of the lesion as suggested by interventional radiologist. Hence, sclerotherapy was instituted. However the decision making depends on the location and accessibility of the area. Vogelaere [46] studied his case of pseudoaneurysm involving superficial temporal

artery and considered surgical resection as definitive management as it eliminates the risk of spontaneous rupture and hemorrhage. There are no consequences to tissue perfusion with ligation of these branches and the risk of perioperative complications is minimal [13].

Though spontaneous regression has been reported to occur in most cases over a period of 90 days; in head-face-neck (HFN) region, slow progressive and late development of symptoms like dyspnoea, dysphagia and facial palsy warrant treatment. Aspiration of the lesion with intraleisional injection of sclerosing agent can be a good option. In cases of rapid progression of similar symptoms in HFN region, invasive procedure is recommended.

Conflict of interest None.

References

1. Feliciano DV, Cruse PA, Burch JM, Bitondo CG (1987) Delayed diagnosis of arterial injuries. *Am J Surg* 154:579–584
2. Hertzner NR (2000) Extracranial carotid aneurysms: a new look at an old problem. *J Vasc Surg* 31:823–825
3. Yuen JC, Gray DJ (2000) Endovascular treatment of a pseudoaneurysm of a recipient external carotid artery following radiation and free tissue transfer. *Ann Plast Surg* 44:656–659
4. Conner WC III, Rohrich RJ, Pollock RA (1998) Traumatic aneurysms of the face and temple: a patient report and literature review, 1644 to 1998. *Ann Plast Surg* 41:321–326
5. Cooperband BR, Friedel W, Bhatt GM et al (1989) False aneurysm of the facial artery. *J Oral Maxillofac Surg* 47:1327–1329
6. Hettige R, Snelling J, Bleach N (2010) The dangers of kite flying: pseudoaneurysm of the facial artery following blunt trauma. *J Laryngol Otol* 124:223–225
7. Pappa H, Richardson D, Niven S (2008) False aneurysm of the facial artery as complication of sagittal split osteotomy. *J Craniomaxillofac Surg* 36:180–182
8. Rayati F, Parsa H, Abed PF, Karagah T (2010) Facial artery pseudoaneurysm following surgical removal of a mandibular molar. *J Oral Maxillofac Surg* 68:1683–1685
9. Germiller JA, Myers LL, Harris MO, Bradford CR (2001) Pseudoaneurysm of the proximal facial artery presenting as oropharyngeal hemorrhage. *Head Neck* 23:259–263
10. Quinn JH (1978) Aneurysmal atherosclerosis of the inferior labial artery with segmental arteriectomy. *J Am Dent Assoc* 96:663–665
11. Miller SH, Petro JA, Latshaw RF (1980) Postmentoplasty hemorrhage from pseudoaneurysm of the inferior labial artery. *Plast Reconstr Surg* 65:353–355
12. Bresner M, Brekke J, Dubit J, Finizio T (1972) False aneurysm of the facial region. *J Oral Surg* 30:307–313
13. Dediol E, Manojlovic S, Biocic J, Franceski D, Ivanac G (2011) Facial artery pseudoaneurysm without evidence of trauma. *Int J Oral Maxillofac Surg* 40:988–990
14. Gerbino G, Roccia F, Grosso M et al (1997) Pseudoaneurysm of the internal maxillary artery and Frey's syndrome after blunt facial trauma. *J Oral Maxillofac Surg* 55:1485–1490
15. Kraus RR, Bergstein JM, DeBord JR (1999) Diagnosis, treatment, and outcome of blunt carotid arterial injuries. *Am J Surg* 178:190–193
16. Karas DE, Sawin RS, Sie KC (1997) Pseudoaneurysm of the external carotid artery after tonsillectomy. A rare complication. *Arch Otolaryngol Head Neck Surg* 123:345–347

17. Minion DJ, Lynch TG, Baxter BT, Lieberman R (1994) Pseudoaneurysm of the external carotid artery following radical neck dissection and irradiation: a case report and review of the literature. *Cardiovasc Surg* 2:607–611
18. Nadig S, Barnwell S, Wax MK (2009) Pseudoaneurysm of the external carotid artery—review of literature. *Head Neck* 31:136–139
19. El AS, Guo W, Loveless T, Dhaliwal SS, Quereshy FA, Baur DA, Kaka NS (2011) Pseudoaneurysm of the external carotid artery secondary to subcondylar fracture. *Int J Oral Maxillofac Surg* 40:644–646
20. Zachariades N, Skoura C, Mezitis M et al (2000) Pseudoaneurysm after a routine transbuccal approach for bone screw placement. *J Oral Maxillofac Surg* 58:671–673
21. Lanigan DT, Hey JH, West RA (1990) Major vascular complications of orthognathic surgery: hemorrhage associated with Le Fort I osteotomies. *J Oral Maxillofac Surg* 48:561–573
22. Lanigan DT, Hey JV, West RA (1991) Major vascular complications of orthognathic surgery: false aneurysms and arteriovenous fistulas following orthognathic surgery. *J Oral Maxillofac Surg* 49:571–577
23. Kornbrot A, Shaw AS, Toohey MR (1991) Pseudoaneurysm as a complication of arthroscopy. A case report. *J Oral Maxillofac Surg* 49:1226–1228
24. Rich NM, Hobson RW, Collins GJ (1975) Traumatic arteriovenous fistulas and false aneurysms: a review of 558 lesions. *Surgery* 78:817–828
25. Clark R, Lew D, Giyanani VL et al (1987) False aneurysm complicating orthognathic surgery. *J Oral Maxillofac Surg* 45:57–59
26. Golden GT, Fox JW, Williams GS et al (1975) Traumatic aneurysm of the superficial temporal artery. Squash-ball disease. *JAMA* 234:517–518
27. Krishnan DG, Marashi A, Malik A (2004) Pseudoaneurysm of internal maxillary artery secondary to gunshot wound managed by endovascular technique. *J Oral Maxillofac Surg* 62:500–502
28. Amirjamshidi A, Abbassioun K, Rahmat HR (2000) Traumatic aneurysms and arteriovenous fistulas of the extracranial vessels in war injuries. *Surg Neurol* 53:136–145
29. Ramsay DW, McAuliffe W (2003) Traumatic pseudoaneurysm and high flow arteriovenous fistula involving internal jugular vein and common carotid artery. Treatment with covered stent and embolization. *Australas Radiol* 47:177–180
30. Martinod E, Warnier G, Aupecle B et al (1999) False aneurysm of the left common carotid artery 52 years after penetrating injury of the chest. *J Trauma* 47:400–402
31. Silva AC, O’Ryan F, Beckley ML, Young HY, Poor D (2007) Poor pseudoaneurysm of a branch of the maxillary artery following mandibular sagittal split ramus osteotomy: case report and review of the literature. *J Oral Maxillofac Surg* 65:1807–1816
32. Quereshy FA, Choi S, Buma B (2008) Traumatic pseudoaneurysm of the superficial temporal artery in a pediatric patient: a case report. *J Oral Maxillofac Surg* 66:133–135
33. Lonn L, Olmarker A, Geterud K et al (2004) Prospective randomized study comparing ultrasound-guided thrombin injection to compression in the treatment of femoral pseudoaneurysms. *J Endovasc Ther* 11:570–576
34. Feld R, Patton GM, Carabasi RA et al (1992) Treatment of iatrogenic femoral artery injuries with ultrasound guided compression. *J Vasc Surg* 16:832–840
35. Kazmers A, Meeker C, Nofz K et al (1997) Nonoperative therapy for post catheterization femoral artery pseudoaneurysms. *Am Surg* 63:199–204
36. Davis KA, Mansour MA (2000) Pseudoaneurysms of the extremity without fracture: treatment with percutaneous ultrasoundguided thrombin injection. *J Trauma* 29:818–821
37. Bogale S, Alemayehu W, Abate N (2002) Management of traumatic arterio-venous fistulas, experience in Armed Forces General Hospital, Addis Ababa. *Ethiop Med J* 40:129–139
38. Benndorf G, Campi A, Hell B et al (2001) Endovascular management of a bleeding mandibular arteriovenous malformation by transfemoral venous embolization with NBCA. *Am J Neuroradiol* 22:359–362
39. Cockcroft KM, Carew JF, Trost D et al (2000) Delayed epistaxis resulting from external carotid artery injury requiring embolization: a rare complication of transsphenoidal surgery: case report. *Neurosurgery* 47:236–239
40. Bynoe RP, Kerwin AJ, Parker HH et al (2003) Maxillofacial injuries and life-threatening hemorrhage: treatment with transcatheter arterial embolization. *J Trauma* 55:74–79
41. Huang F, Kuo YL, Ko SF et al (2003) Percutaneous puncture and pre-operative cyanoacrylate obliteration of a traumatic false aneurysm of an angular artery branch. *Br J Radiol* 76:746–749
42. Sanchez F, Delgado F, Ramos M (2000) Pseudoaneurysm of the superficial temporal artery treated by embolization: report of a case. *J Oral Maxillofac Surg* 58:819–821
43. Ghersin E, Karram T, Gaitini D (2003) Percutaneous ultrasonographically guided thrombin injection of the iatrogenic pseudoaneurysms in unusual sites. *J Ultrasound Med* 22:809–816
44. Zachariades N, Rallis G, Papademetriou P et al (2001) Embolization for the treatment of pseudoaneurysm and transaction of facial vessels. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 92:491–494
45. Peoples JR, Herbosa EG, Dion J (1988) Management of internal maxillary artery hemorrhage from temporomandibular joint surgery via selective embolization. *J Oral Maxillofac Surg* 46:1005–1007
46. Vogelaere KD (2004) Traumatic aneurysm of the superficial temporal artery: case report. *J Trauma* 57:399–401