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Pseudoaneurysm of the internal carotid artery: A forgotten complication of tonsillitis?

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Abstract
Pseudoaneurysm of the internal carotid artery is an uncommon but potentially lethal complication of tonsillar or peritonsillar sepsis, which appears to have occurred more frequently prior to the introduction of penicillin. Management of such a case is discussed, and a literature review presented.

Introduction

Tonsillitis is a common acute infection, particularly amongst children and young adults. Complications of tonsillitis (mainly peritonsillar cellulitis or abscess, but occasionally parapharyngeal abscess) commonly present as emergencies to ENT units. Life-threatening complications of tonsillitis are now rare but may still occur, as the following case illustrates.

Case report

A previously fit 7-year-old boy presented as an emergency with a two-week history of tonsillitis. This had failed to respond to a course of oral antibiotics. Immediately prior to admission, he suffered a sudden severe epistaxis. On examination, he was pale but not shocked. There was some anterior displacement of the left tonsil, but no obvious sign of a peritonsillar abscess. Tender lymph nodes were found in the left deep cervical chain. There was no evidence of recent haemorrhage within either nasal cavity. Investigations showed a haemoglobin concentration of 10.2 g/dl and whilte cell count 31×10^9/l. A provisional diagnosis of early peritonsillar cellulitis was made, and intravenous benzylpenicillin commenced.

Over the following 24 hours two sudden, severe episodes of bleeding from nose and mouth occurred. Blood loss was approximately 500 ml on each occasion, and blood transfusion was given. Doubt was cast on the initial diagnosis, and in view of increasing displacement of the left tonsil a juvenile angiofibroma of the nasopharynx was suspected. Examination under anaesthesia was therefore performed. The left tonsil was found to be displaced anteriorly by a large mass lying outside the lateral pharyngeal wall, and extending from the nasopharynx to just below the lower pole of the tonsil. The overlying mucosa was normal, apart from one small area in the nasopharynx which had ulcerated. Transmitted pulsation from the nearby carotid sheath was noted, but no expansile pulsation was present. It was felt unlikely that the mass was an angiofibroma, but more likely to be a tumour arising in the parapharyngeal space. A small biopsy was taken from the edge of the ulcerated area: no bleeding was encountered. Histological examination of the biopsy showed only non-specific granulation tissue, and the pathologist suggested that a deeper specimen may be required to obtain a representative sample of the lesion.

Another severe haemorrhage occurred, and so a further examination under anaesthesia was performed. The mass had not enlarged, and no pulsation was seen. The ulcerated area was carefully examined; under the superficial slough, the mass was seen to consist of firm blood clot. An internal carotid artery pseudoaneurysm was suspected, and the ulcerated area packed with absorbable sponge and oversewn. As suitable imaging facilities for further investigation were not available locally, the child was transferred to the Regional Neurosurgical Unit.

Carotid angiography showed a large pseudoaneurysm, 4 cm in diameter, arising from the left internal carotid artery immediately below the skull base (Figs. 1 & 2). The internal carotid artery distal to the pseudoaneurysm was patent. Good cross-circulation via the circle of Willis was demonstrated. Computed tomography (CT) demonstrated the close relationship of the pseudoaneurysm to the left tonsil (Fig. 3). In view of the series of severe haemorrhages that had already occurred and the danger of further bleeding, it was decided to ligate the left internal carotid artery. This was easily accomplished in the neck above the carotid bifurcation. No neurological deficit was detected post-operatively. The patient made a good recovery with no further bleeding. Repeat CT scan, five weeks after operation, showed considerable reduction in size of the pseudoaneurysm with no demonstrable post-contrast enhancement.

Discussion

Pseudoaneurysms of the cervical internal carotid artery are rare and usually follow gunshot or stab injuries (Tovi *et al.*, 1987), although one has been described after blunt head injury (Pathak, 1972). Iatrogenic causes include needle puncture, arterial grafting and tonsillectomy (Tovi *et al.*, 1987).

In the pre-antibiotic ear erosion of the great vessels of the neck, with or without pseudoaneurysm formation, was a well-recognized sequel to parapharyngeal or retropharyngeal sepsis. Salinger and Pearlman (1933) described 231 cases which had been reported in the literature up to that point. In 90 of the fatal cases post-mortem examinations had been performed, and these revealed pseudoaneurysms in twenty-four. With the exception of three common carotid, one external carotid and one internal maxillary lesion, all of the remainder arose from the internal carotid artery. This structure normally lies in the parapharyngeal space approximately 2.5 cm from the tonsil, but tortuosity of the vessel greatly reduces this distance in some individuals (Cairney, 1924) and may place it in great danger should suppuration occur.

Since the introduction of penicillin toward the end of the second world war, we have only been able to trace seven

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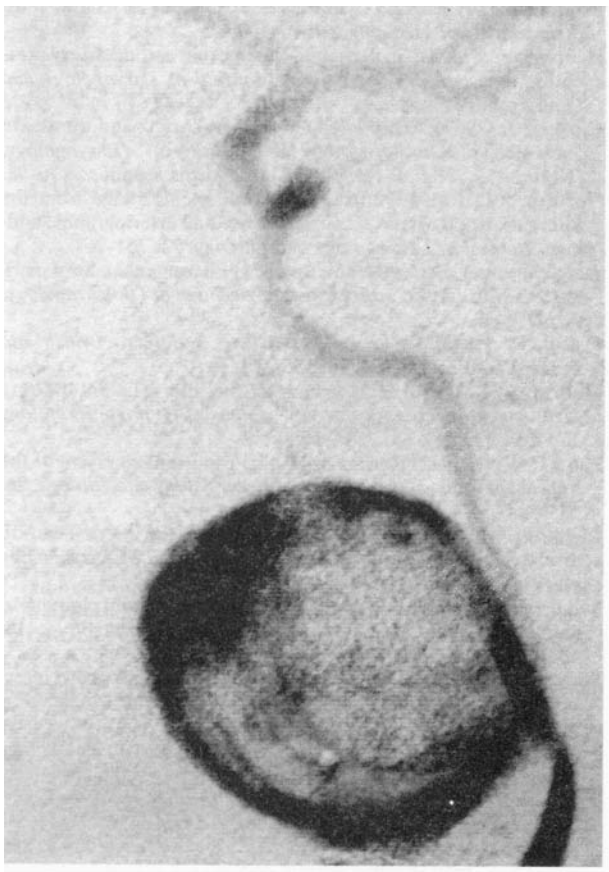

FIG. 1

Carotid angiogram showing pseudoaneurysm arising from left internal carotid artery and patency of the distal vessel.

reported cases in the English language literature of pseudoaneurysm of the cervical internal carotid artery as a result of parapharyngeal sepsis (Metson, 1956; Zook and Glover, 1970; Eneroth and Tham, 1971; Gilchrist, 1973; Blum and McCaffrey, 1983; Stevens, 1990), although a few other reports have occurred in foreign languages (Eneroth and Tham, 1971).

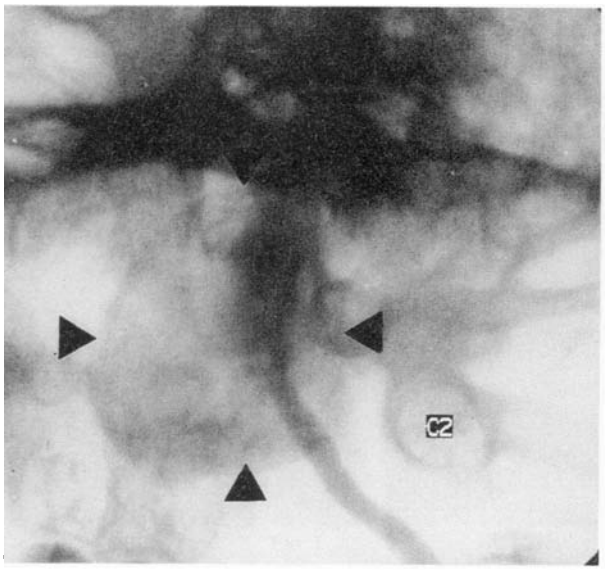

FIG. 2

Unsubtracted image from carotid angiogram demonstrating the relationship of the pseudoaneurysm (arrowheads) to the skull base.

Thirteen further cases of carotid artery erosion (of which four prsented with aural haemorrhage) have been recorded (Woodruff, 1945; Richardson, 1946; Harrison, 1954; Hogarth, 1959; Todman, 1960; Hays, 1964; Alexander *et al.*, 1968; Langenbrunner and Dajani, 1971; Garino and Ryan, 1987), and it is possible that pseudoaneurysm formation may have occurred in some of these. Most of the reported cases have been in children, with some in young adults. Two cases of elderly patients with atherosclerotic true carotid aneurysms that presented at the same time as peritonsillar abscesses have been recorded (Gage *et al.*, 1964; Henry, 1974). One recent report (Griffies *et al.*, 1988) failed to identify a single case of major vessel erosion or pseudoaneurysm formation in a large 'at-risk' population.

The pattern of sudden, severe, recurrent haemorrhage seen in our patient is typical of an internal carotid pseudoaneurysm or erosion. Many patients have a palpable neck mass (Woodruff, 1945; Metson, 1956; Hogarth, 1959; Todman, 1960; Alexander *et al.*, 1968; Langenbrunner and Dajani, 1971; Stevens, 1990), but the few enlarged nodes seen in our patient rapidly resolved on benzylpenicillin. Neurological involvement may occur, particularly in the form of an ipsilateral Horner's syndrome (Zook and Glover, 1970; Blum and McCaffrey, 1983), but cranial nerves VII, IX, X, XI, XII may also be affected (Metson, 1956; Alexander *et al.*, 1968; Zook and Glover, 1970; Eneroth and Tham, 1971; Langenbrunner and Dajani, 1971; Gilchrist, 1973). Recovery may occur after appropriate treatment (Zook and Glover, 1970; Eneroth and Tham, 1971).

Definitive treatment must be carried out as soon as the diagnosis is confirmed, as the patient may exsanguinate at any time. Ligation of the internal carotid artery in the neck has been the standard treatment for many years, but obviously carries a potential risk of stroke or even death. If cross-circulation cannot be demonstrated at the time of carotid angiography, gradual clamping of the carotid or carotid ligation plus intra-

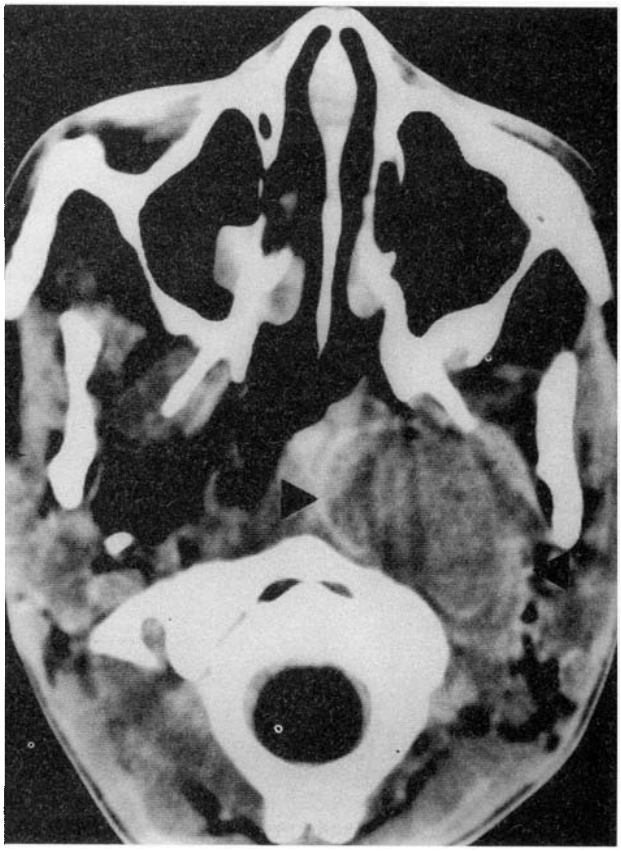

FIG. 3

CT scan showing internal carotid pseudoaneurysm (arrowheads) displacing left tonsil into pharyngeal lumen.

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cranial-extracranial bypass may be considered safer procedures. Some authors state that back-flow from the circle of Willis can cause further bleeding and suggest distal transcatheter occlusion using steel coils to prevent this (Tovi *et al.*, 1987), although placing such coils in a potentially infected field may not itself be without risk.

Although the first case was reported by Liston in 1843, the standard British textbook of otolaryngology (Hibbert, 1987) does not mention pseudoaneurysm formation as a potential complication of peritonsillar or parapharyngeal abscess. Awareness of this condition is required in order to prevent tragic fatality, especially as the affected patient is likely to be a small child.

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