An angiographic complication of vertebral arteriovenous fistula

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Complications of percutaneous angiography have been recorded and reported periodically throughout the literature (Abbott, Gay, and Goodall, 1952; Perese, Kite, Bedell, and Campbell, 1954). These complications range from something so minor as a transient Babinski response to immediate or eventual fatality. The following case is described so that an opportunity is afforded to visualize a vertebral arteriovenous fistula arising as a complication of percutaneous carotid angiography. Three cases have previously been recorded but all followed intended direct percutaneous vertebral angiography (Jamieson, 1965; Olson, Baker, and Svien, 1963; Sutton, 1962). Numerous other reports of vertebral arteriovenous fistula exist (Davis, 1960; Elkin and Harris, 1946; Heifetz, 1945; Matas, 1893). By far the majority are due to missile and stab wounds although there is one report (Svolos, Nomikos, and Tzoulidis, 1965) of a congenital lesion and an occasional instance of blunt trauma to the neck, with or without bony fracture, as being the aetiological agent (Elkin and Harris, 1946). Matas (1893), in a scholarly review of the literature up to 1893, also cites a case secondary to being gored by an ox and two cases associated with cervical tuberculosis.

CASE REPORT

A 36-year-old Caucasian woman, without complaint, was referred to the Neurosurgery Service at Brooke General Hospital for evaluation of an asymptomatic systolic bruit heard throughout the left neck. This patient's difficulty began in 1956 when she had a syncopal episode associated with left hemicephalgia and retro-orbital extension. She was admitted to her local hospital at that time and a left percutaneous carotid angiogram was performed since the diagnosis of intracranial aneurysm was entertained. This study proved to be normal as was the remainder of her evaluation at that time. No abnormalities on examination, including auscultation of the head, neck and thorax, were reported. Some difficulty was encountered in performing the carotid angiogram, in that a number of attempts were required before the carotid artery was successfully cannulated with the Grino

needle. No apparent untoward effects transpired and after an adequate course of conservative treatment the patient's symptoms subsided and she was discharged. She had since remained well except for the development of an unrelated bronchopneumonia in January 1965. During the course of evaluation and treatment for this pneumonia, at another hospital, a loud systolic bruit was noted in the region of the left superior pulmonary apex and the entire left neck. The pneumonia responded to antibiotic therapy without incident but the bruit persisted. This bruit was heard only by the examiner and not by the patient. No evidence of cardiac enlargement or decompensation was found nor has there ever been. With the history of prior carotid angiography, it was felt that the possibility of a carotid artery-jugular vein fistula existed and, therefore, a repeat left carotid angiogram was performed. This, however, proved to be normal without evidence of arteriovenous fistula of the carotid system in the head or neck. Partially occluding atheromatous plaques were likewise not present in the vessels studied.

After arrival at this hospital, the patient's history and findings were reviewed and the bruit over the left neck confirmed. A left retrograde brachial arteriogram was performed and thereupon demonstrated an arteriovenous fistula of the left vertebral vessels as seen in the accompanying radiographs (Figs. 1 and 2).

DISCUSSION

A vertebral arteriovenous fistula as a complication of angiography has previously been recorded in the literature in only three instances, and all of these were associated with intended direct percutaneous puncture of the vertebral artery. The present case was associated with percutaneous carotid angiography. Undoubtedly, the vertebral artery was punctured during the course of attempting to cannulate the carotid artery. This is not an infrequent occurrence with experienced angiographers.

This patient is asymptomatic with only an objective bruit over the left neck but should surgical therapy become necessary, the ideal treatment would be that of Jamieson (1965) wherein the fistula was exposed, identified, and ligated, with preservation of vertebral artery flow. Apparently a similar technique

FIG. 1a.

FIG. 1b.

FIG. 1. Antero-posterior and lateral phases of a left retrograde brachial angiogram showing the arterial extent of the vertebral arteriovenous fistula.

FIG. 2a.

FIG. 2b.

FIG. 2. Antero-posterior and lateral views of the vertebral arteriovenous fistula showing the venous components and the full extent of the lesion.

and result were obtained by Mr. Logue in treating the case reported by Sutton (1962). Details of the operative procedure are, unfortunately, lacking. Proximal ligation of the vertebral artery has not been successful (Olson *et al.*, 1963). Proximal and distal ligation with excision of the lesion is, however, curative (Elkin and Harris, 1946; Heifetz, 1945; Matas, 1893), but this often requires extensive exposure, especially if the fistula is associated with a large false aneurysmal sac. Proximal and distal ligation at widely separated levels cannot be expected to be curative in view of the known extensive collateral circulation of the vertebral artery by way of the muscular branches in the neck. Persistent bruit after such treatment forewarns of recurrence of the problem, now made more difficult because of the alteration in the usual anatomy of the region. No matter what surgical plan were chosen, certainly the status of the opposite vertebral artery would have to be ascertained. Fortunately, there is no retrograde filling of this lesion through the carotid system and, therefore, a 'vertebral-steal' syndrome need not concern us in this case.

Indeed this particular angiographic complication is rare. Nevertheless, other complications are not; and, in spite of the frequent necessity for these studies, our indications should always remain clear-cut and angiography not be allowed to degenerate into a routine procedure. Arteriovenous fistulas, peripherally, are frequently accomplished by cardiac enlargement and decompensation if allowed to go untreated for any definite length of time (Davis, 1960). A recent chest film of our patient, presumably nine years after the development of the lesion, shows no radiological evidence of cardiac enlargement or decompensation. Such a complication has not been reported by other authors in cases of vertebral arteriovenous fistulae. It is felt that the volume of blood in the vertebral system is not of sufficient magnitude to exceed the cardiac reserve in an otherwise normal cardiovascular system.

SUMMARY

A vertebral arteriovenous fistula resulting as a com-

plication of percutaneous carotid angiography is presented. This rare complication is at this time, and in this case, merely an anatomical and pathophysiological curiosity from which no conclusions are drawn. It is possible that some peruser of this article will one day be called upon to render definitive therapy. Forewarned, therefore, is to be forearmed.

ADDENDUM

Since this paper was prepared for publication, three cases in adult females have been reported by Bergström and Lodin (1966). Two followed percutaneous carotid puncture in which inadvertent vertebral artery puncture was recognized in one. The third case resulted from planned vertebral artery puncture. Cardiac involvement was absent in all cases; yet in one, the lesion was known to have been present for 10 years. This case was untreated. The second was treated by excision and the same was planned for the third. A plea was made for intensified training in the technique of puncture and for the collective experience of these techniques to be concentrated in the hands of a few.

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