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Expanding Aneurysm of the Radial Artery after Frequent Puncture

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The radial artery at the wrist is commonly used for arterial blood sampling and hemodynamic measurement. The techniques of intermittent needle puncture or placement of an indwelling plastic catheter are infrequently associated with serious complications. This report describes an expanding aneurysmal dilatation of the radial artery following repeated puncture and cannulation, necessitating excision of the involved segment of the vessel.

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REPORT OF A CASE

A 79-year-old woman was admitted to the Massachusetts General Hospital in respiratory distress due to fracture of the larynx after an automobile accident. Emergency tracheostomy and operative repair were performed. The postoperative course was complicated by both pneumonia and intermittent pulmonary edema, for which the patient was treated with mechanical ventilation, antibiotics, digitalis, and diuretics. Early during her postoperative course the patient's right radial artery was punctured ten times with a 20-gauge needle for arterial blood-gas analysis. When the need for prolonged respiratory care became evident, an indwelling arterial catheter (size 18 Argyle) * was placed percutaneously at this site. It remained *in situ* for ten days. Eighteen days after removal of

* Aloe Medical, St. Louis, Missouri.

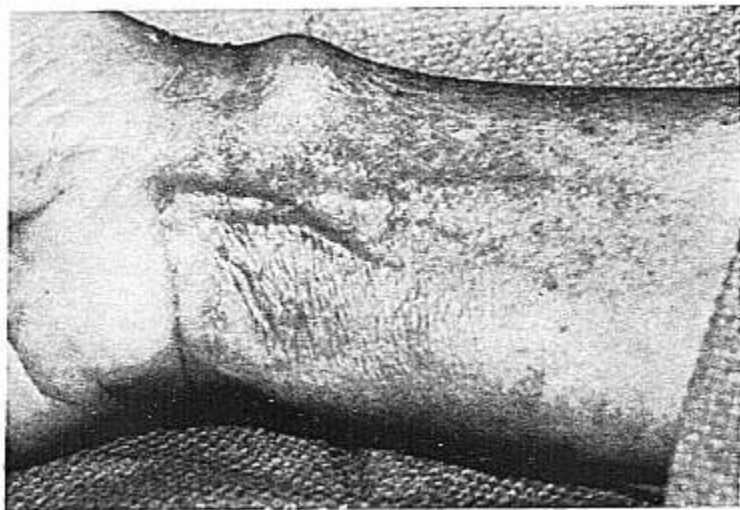


FIG. 1. The aneurysm of the right radial artery just before incision of the skin.

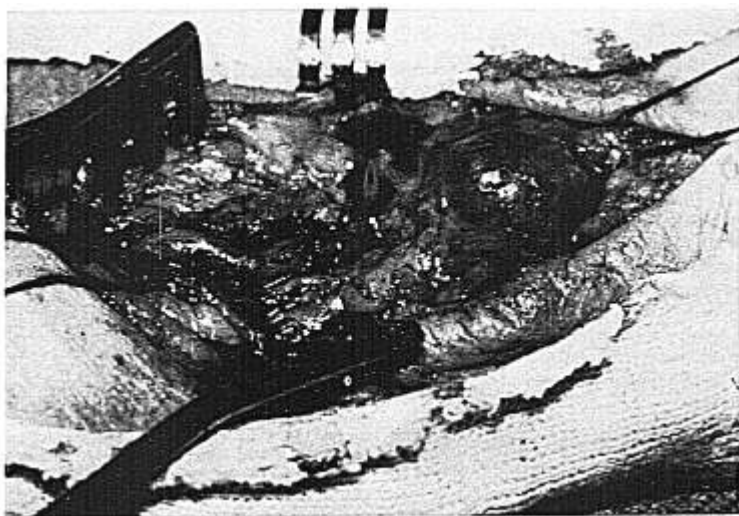


FIG. 2. The aneurysm during operation.

the catheter, a small tender pulsatile swelling was noted at the site of radial-artery cannulation. Because of progressively increasing size and tenderness, the mass was resected eight days later and found to be a radial-artery aneurysm 2 cm in diameter (figs. 1 and 2). The artery was reconstructed by an end-to-end anastomosis. Cultures of the radial aneurysm failed to grow any microorganism. Two months later normal pulsation was felt at the site of anastomosis and the circulation to the hand appeared satisfactory. However, indirect flow measurement with a segmental digital plethysmograph and an Allen test revealed a significant decrease of flow to the hand in the radial artery.

DISCUSSION

Despite an estimated more than 10,000 radial artery punctures performed at the Massachusetts General Hospital by staff of varying levels of experience, this is the first aneurysm encountered. We were unable to find a previous report of this complication. There was no evident associated cause for this occurrence, i.e., infection, hematoma, etc.

The usual practice at this hospital involves intermittent arterial puncture with a 20-gauge needle when only a small number of samples is needed. An indwelling plastic catheter (size 18 Argyle in adults, size 20 Argyle in children) is inserted percutaneously whenever continuous pressure measurement or frequent or extended sampling is required. The radial or ulnar artery at the wrist is preferred because complications which are predominantly due to interrupted blood flow occur infrequently, a finding ascribed to the dependability of collateral circulation.¹⁻³ In contrast, other puncture sites have been associated with a significant list of complications.⁴⁻⁶ The arteries at the wrist are subject to anatomic variation and to arterial disease, sometimes more severe in one arm than in the other.^{7, 8} Thus, the adequacy of

collateral flow to the hand should be established prior to cannulation. In the present case it is unclear whether repeated puncture, cannulation, or the combination was responsible for this complication.

Estimation of blood flow to the hand after primary reconstruction of the artery demonstrated a decrease in spite of an easily palpable pulse. During arterial cutdown we have frequently observed obstruction of the artery by fibrosis at sites of previous arterial cannulation in patients with palpable radial arteries, the distal radial pulse being transmitted via the ulnar artery and palmar arch. A radial arterial pulse does not necessarily imply adequate blood flow. Therefore, ulnar-artery instrumentation should obviously be avoided in patients without demonstrable radial-artery collateral flow.

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