Case Report

Common Femoral Artery Ligation after Sarcoma Resection in an Infant

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Abstract

Background Vascular reconstruction in infants constitutes a surgical challenge and is indicated frequently for acute occlusions. With the presence of a subacute vascular occlusion, including that produced by tumor resection, collateral circulation develops quickly. Thus a surgeon can consider tumor and vessel resection, without the need for vascular reconstruction.

Case Description We report the 2-year postoperative outcome of a 2-month-old boy who had a groin synovial cell sarcoma with vascular involvement, treated using limb salvage surgery with resection of the femoral vessels and without performing vascular reconstruction.

Literature Review In adults with military wounds, ligation of the superficial femoral artery and common femoral artery reportedly result in amputation rates of 54% and 86%, respectively. Infants with a common femoral artery ligation may have a lower amputation rate because of some congenital collateral vessels, such as the sciatic artery. Further, when tumors involve major peripheral vessels, subacute or chronic vascular compression likely would facilitate development of collateral circulation. Similar chronic situations have been described in adults treated

with debridement and common femoral artery ligation, after infected femoral artery pseudoaneurysms.

Purposes and Clinical Relevance Considering our patient's history and clinical and radiographic findings, infants with musculoskeletal sarcomas involving vascular structures can be treated selectively with tumor and vessel resection without the need for vascular reconstruction if distal limb perfusion is detected intraoperatively.

Introduction

Obtaining disease-free margins may require resection of adjacent vascular structures. In the adult population, limb salvage can be achieved in the majority of patients, even when the resection includes the artery and vein, owing to the possibility of vascular reconstruction [2]. Arterial reconstruction in children presents a challenge even for experienced vascular surgeons. In infants younger than 6 months with acute arterial thrombosis Chaikof et al. successfully restored vascular flow with thrombectomy [3]. Surgical ligation of the femoral vessels after tumor resection reflects one type of acute trauma, although it is not known whether the vessels require reconstruction, given a likely greater potential for rapid collateral circulation than in adults.

We describe an infant treated with limb salvage surgery, in which the femoral vessels were resected without performing any vascular reconstruction.

Case Report

A 2-month-old boy presented to the outpatient clinic with a left groin mass. The patient's family related a 3-week

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Each author certifies that his institution has approved the reporting of this case report and that all investigations were conducted in conformity with ethical principles of research.

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Fig. 1 A clinical photograph shows the left groin mass.

history of progressive left groin tumor. The patient had no significant medical, surgical, or family history of malignancies. The patient's family denied recent trauma to the affected extremity. Patient weight and size were normal for his age. Physical examination revealed an obvious groin mass (Fig. 1). The mass was approximately 4 cm by 4 cm, and its palpation provoked slight discomfort for the patient. His left thigh and leg were symmetrical with the unaffected side. Active knee flexion and extension, foot eversion, ankle dorsiflexion, and great toe extension were similar compared with the contralateral side. No neurologic deficits were detected. The patient had no evidence of metastasis.

Plain radiographs of the pelvis were normal. MRI of the pelvis revealed a large 4.5 cm by 4.7 cm heterogeneous mass in the region of the left Scarpa's triangle with involvement of the femoral vessels and nerve. No evidence of connection was observed between the mass and the hip (Fig. 2A). MR angiography showed compression of the femoral artery by the tumor (Fig. 2B–C). We observed no evidence of major collateral circulation or persistence of the sciatic artery.

After evaluation of the images, we performed an open biopsy using an anterior approach. The final histologic diagnosis was biphasic synovial cell sarcoma. Once the diagnosis was achieved, we instituted preoperative chemotherapy, and observed a response after a combination of four cycles of ifosfamide and doxorubicin. Surgical resection was performed 12 weeks after diagnosis through an ilioinguinal approach. We confirmed the compromise of the femoral nerve and vessels at the pelvic emergence level (Fig. 3). The femoral artery was ligated just under the inguinal ligament, preserving the lateral circumflex and inferior epigastric arteries. The same procedure was performed with the femoral vein. The femoral vessels were

Fig. 2A–C (A) A preoperative MR image shows no connection between the mass and the hip. (B) The vascular structures (arrow) in the tumor are evident on this MR image. (C) MR angiography shows compression of the femoral artery.

Fig. 3 An intraoperative photograph shows the relationship between the vessels and the tumor.

ligated 2 cm distal to the tumor. We performed en bloc tumor resection, including femoral nerve and vessels. After the resection we waited 30 minutes, observing distal limb perfusion status, and detected a slow but present capillary flow with good distal perfusion. Owing to the apparently good perfusion we elected not to reconstruct the femoral vessels. The wound was closed without a drain.

Postoperatively, the patient's limb was checked every 2 hours by physical examination and pulse oximetry for the first 48 hours and every 6 hours for the next 48 hours. After 5 days, the patient was discharged with no signs of distal ischemia. Adjuvant chemotherapy was administered and no postoperative radiotherapy was given.

During the 2-year followup, the patient was checked clinically and with MR angiography every 3 months (Fig. 4). At the 2-year followup, his left thigh and leg were symmetrical to the unaffected side. The patient lost active knee extension, but knee flexion, foot eversion, ankle dorsiflexion, and great toe extension were similar compared with his contralateral side. No signs of limb hypotrophy were observed, and collateral circulation appeared well developed on MR angiography. There was no evidence of local recurrence at last followup.

Discussion

Synovial cell sarcomas in infants are very rare [8, 11]. Fortunately, major injuries to the peripheral vascular system are also rare in infants. When present, they usually have an iatrogenic origin and a catastrophic result, owing to the acute mechanism of occlusion [6, 10, 12]. Another rare cause of vascular injury can be observed after malignant tumor resections. These situations require the use of surgery for vascular reconstruction; however, in infants, there is literature available to support the effectiveness of such procedures when arteries or veins of relatively small

Fig. 4 MR angiography performed after 2 years of followup shows the collateral limb irrigation after ligation of the common femoral artery.

diameter (0.3 to 1 mm) are involved [4, 7, 13]. Also, if the tumor involved major peripheral vessels, the patient would have subacute or chronic vascular compression. In this scenario, the development of collateral circulation owing to chronic tumor compression is possible, leading to common artery ligation as a surgical alternative. Similar chronic situations have been described in adult patients treated with debridement and common femoral artery ligation, after infected femoral artery pseudoaneurysms [1].

We have found no other cases of common femoral ligation after tumor resection in an infant. In the adult population, DeBakey and Simeone [5] reported that ligation of the superficial femoral artery and common femoral artery for military wounds resulted in amputation rates of 54% and 86%, respectively. We do not believe these cases can be compared with our case, but suspect infants with a common femoral artery ligation may have a lower amputation rate because of some congenital collateral vessels, such as the sciatic artery [9] or perhaps their greater ability to open collateral circulation.

Considering our patient's history and clinical and radiographic findings, infants with musculoskeletal

sarcomas involving vascular structures can be treated with tumor and vessel resection without the need for vascular reconstruction if adequate distal limb perfusion is detected intraoperatively. In such a situation, it is critical to perform adequate preoperative and postoperative vascular evaluations to select and treat these patients.

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