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Experience with aortic grafting during excision of large abdominal neuroblastomas in children

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Abstract

Background: Total or near total resection of high-risk, stage 4 abdominal neuroblastoma has been correlated with improved local control and overall survival but may be complicated by vascular injury. We describe our experience in the management of significant aortic injuries during this procedure.

Methods: With the institutional review board waiver, medical records of children who had major abdominal aortic reconstruction during neuroblastoma resection from 1996 to 2006 were retrospectively reviewed.

Results: There were 5 children with aortic grafting: 3 girls and 2 boys. Mean age at surgery was 7.2 years (range, 16 months to 17 years). Two children were operated on for recurrent retroperitoneal disease. Tumor encasement of the aorta was seen in all children. In 3 children, the injury occurred during dissection of paraaortic and interaortocaval lymph nodes below the level of the renal arteries. In the remaining 2 children, injury occurred early during mobilization of the tumor. Three polytetrafluoroethylene tube grafts and 1 on-lay patch graft were used to repair the 4 distal aortic injuries. One 4-year-old female with aortic and renal arterial injuries was managed with an aortic Dacron tube graft and a polytetrafluoroethylene tube graft for the renal artery. The mean period of follow-up is 28 months after aortic graft (range, 3 months to 10 years). Total colonic ischaemia, transient acute tubular necrosis, and duodenal perforation were seen in one child, who needed subtotal colectomy and ileostomy. Another child with an omental patch over the graft had a transient duodenal obstruction, which was managed conservatively. There were no other complications, and 4 of the 5 children are disease-free to date. One child at 10 years after his distal aortic tube graft remained asymptomatic with normal distal blood flow on magnetic resonance angiogram and with normal growth.

Conclusion: The neuroblastoma surgeon should be prepared to perform aortic and vascular reconstruction. Aortic encasement, preoperative radiation therapy, and reoperative surgery were observed in these patients and may be risk factors.

Many children with abdominal neuroblastoma present with unresectable large tumors and retroperitoneal lymph node involvement [1]. Although neoadjuvant chemotherapy

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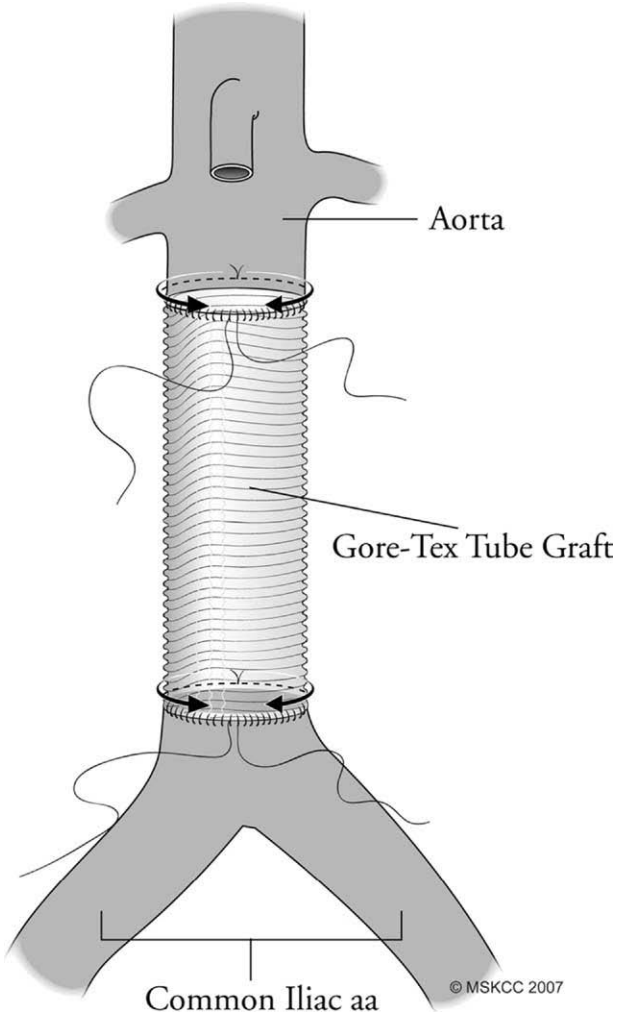

Fig. 1 Diagram illustrating the technique used to sew in the PTFE tube grafts.

improves local resectability [2-4], total or near total resection of these tumors still poses a significant risk to the major retroperitoneal vessels.

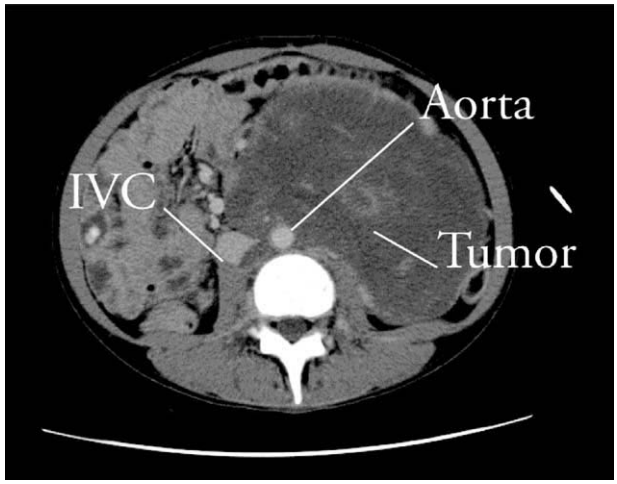

Fig. 3 Preoperative computed tomographic scan showing a large neuroblastoma encasing both the distal aorta and inferior vena cava, just above the level of aortic bifurcation. IVC indicates inferior vena cava.

Gross total resection (GTR) of neuroblastoma is defined as removal of all visible and palpable neuroblastoma from the primary site and regional lymphatics [5]. Gross total resection or near total resection (removal of more than 90% tumor mass) is correlated with improved local control and overall survival rates in stage 3 and 4 neuroblastoma [2,5-8]. Kiely [8] reported that there were 5 aortic injuries in a retrospective study of 129 patients during neuroblastoma surgery in 1994. However, to the best of our knowledge, no study to date has reported in detail the nature of aortic injury, location or types of repair, and related complications.

We report our experience in 5 children who sustained significant aortic injuries during the resection of retroperitoneal neuroblastomas. In this retrospective review, we have detailed the nature of aortic injuries sustained and the subsequent management and related complications. We have also detailed possible factors leading to a

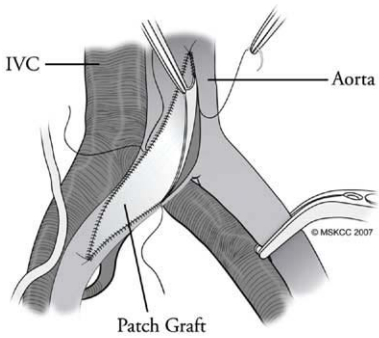

Fig. 2 Diagram illustrating the technique used to sew in the on-lay patch graft and a photograph showing the on-lay graft in position.