Multidisciplinary approach to expansion thoracoplasty for congenital spinal deformity: A preliminary report

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ABSTRACT

Background: In children with congenital chest wall deformities, the vertical expandable prosthetic titanium Rib (VEPTR) has recently been developed to move the emphasis away from corrective spinal fusion, to expanding the deformed hemithorax. The aim of this paper is to demonstrate the need for paediatric surgeons in what is primarily an orthopaedic procedure. **Materials and Methods:** All patients less than 5 years old who had primary congenital scoliosis with poor respiratory function and were treated by VEPTR at our institution in conjunction with the spinal orthopaedic surgeons were reviewed. **Results:** All 6 cases required rib exposure and thoracostomy by a paediatric surgeon. One required exposure of the ribs only, 3 required an extrapleural thoracotomy and 2 required intrapleural thoracotomy with a patch repair of the rib space. None of the patients required blood transfusion and there were no early complications. All patients showed radiological improvement of their spinal and thoracic deformity as well as improvement in their respiratory function. **Conclusion:** Paediatric surgeons play an important role in the thoracic exposure required for this orthopaedic procedure. The benefit of a multidisciplinary approach is highlighted in this paper. The VEPTR implant may replace major spinal fusion surgery in this challenging group of patients.

Key words: Multidisciplinary approach, vertical expandable prosthetic titanium rib

INTRODUCTION

In children with congenital chest wall deformities, the thorax is often unable to support normal respiration or lung growth leading to thoracic insufficiency syndrome.[1] The traditional approach to this problem has been to address the spinal deformity by early spinal fusion which often limits thoracic growth and development.[2] An alternative approach in use since 1989 is the vertical expandable prosthetic titanium rib (VEPTR). This device expands the deformed hemithorax, improving respiratory function and secondarily correcting the spinal deformity.[2,3] Implantation of the VEPTR requires rib exposure and thoracostomy.[4] Our aim is to demonstrate the benefits of a multidisciplinary approach, involving general paediatric surgeons, to complex spinal deformity and to show that VEPTR is an effective alternative to spinal fusion.

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MATERIALS AND METHODS

Six VEPTR devices have been implanted in 5 children less than 5 years old. All patients had primary congenital scoliosis with poor respiratory function. Pre and post-operative assessments of spinal deformity and respiratory status were made by the multidisciplinary team, which included the paediatric respiratory physicians, paediatric spinal surgeons and paediatric general surgeons.

With the patient in the lateral decubitus position, the device is placed vertically along the chest wall attaching each end to healthy ribs above and below the site of abnormality. The ends can then be distracted to achieve expansion of the deformed chest wall. The thoracotomy site defect may require a patch closure with Surgisis Gold (Cook Surgical Products, Ireland Ltd 2006)). Further lengthening of the device is carried out through a small incision as an outpatient procedure two or three times a year.

RESULTS

All primary implantations were carried out successfully with no requirement for blood transfusion and completed in one hour. One patient required exposure of the ribs only, 2 required extrapleural thoracotomy and 2 required intrapleural thoracotomy and patch repair. All thoracic exposure was performed by the paediatric general surgeon.

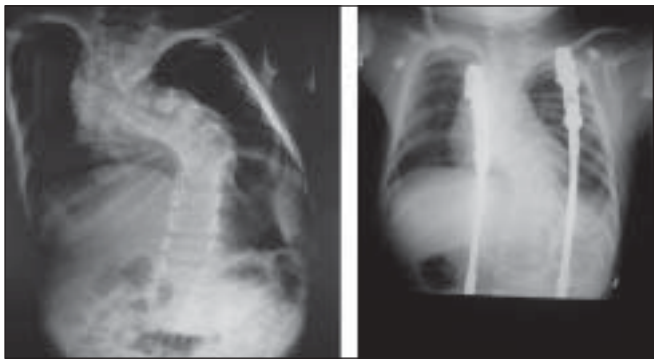


Figure 1: Thoracic deformity before and following placement of the VEPTR device

There have been no complications to date. All patients have now completed 1 expansion at 6 months and have shown radiological improvement of their spinal and thoracic deformity [Figure 1] as well as improvement in their respiratory function as assessed by the respiratory team.

DISCUSSION

Congenital scoliosis and chest wall deformities present a challenging surgical problem. The conventional approach has been early corrective spinal fusion, which may have major long-term implications for spinal and thoracic growth.[2,5] VEPTR is a new technique which focuses on expansion of the deformed hemithorax and secondarily corrects spinal deformity. The technique has been in use since 1989 in the USA and from the beginning, a multidisciplinary approach has been advocated involving paediatric spinal and general surgeons along with paediatricians and paediatric intensivists.[5] This approach achieved VEPTR with no intra-operative complications and minimal blood loss in this present series.

Operative times were much shorter than comparative spinal fusion procedures. All of the patients in this series had impressive cosmetic appearance and a subjective improvement in respiratory function. Other published series reported objective improvement of spinal deformity, spinal growth and lung function and volume.[4,6-8] There have been no post-operative complications in this series, although larger series reported some problems with bony and soft tissue erosion due to the device.[8]

VEPTR is an effective device for the correction of spinal and thoracic deformity. A team approach minimises morbidity associated with the procedure in this challenging group of patients. Further studies are required to quantify more precisely the benefits of the procedure in terms of spinal and thoracic growth and improvements in pulmonary function.

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