The use of a homologous preserved costal cartilage in an infant with Poland’s syndrome

Murat Akal, Murat Kara

Department of Thoracic Surgery, Ankara University School of Medicine, Ibn-i Sina Hospital, 06100, Sihhiye, Ankara, Turkey

Department of Thoracic Surgery, University of Kırıkkale, School of Medicine, 71100, Kırıkkale, Turkey

Received 6 August 2001; received in revised form 22 October 2001; accepted 24 October 2001

Abstract

Poland’s syndrome is a rarely encountered congenital deficiency involving chest wall and breast deformity associated with hand anomalies. Chest wall reconstruction is necessary if the bony thorax is involved. We present the use of a homologous preserved costal cartilage for reconstruction of the chest wall in an infant with Poland’s syndrome, the use of which provided optimal chest wall stability with a favourable outcome. © 2002 Published by Elsevier Science B.V.

Keywords: Poland’s syndrome; Chest wall reconstruction; Costal cartilage

1. Introduction

Poland’s syndrome is an extremely rare congenital chest wall deformity including hypoplasia or absence of pectoralis major and minor muscles associated with hand anomalies, which was originally described by Poland [1]. Chest wall reconstruction is not necessary if it is limited to pectoralis muscles and no functional limitation of the limb exists, except for breast augmentation at full growth, whereas it is required if underlying costal cartilages or ribs are absent [2].

Solvent dehydrated, gamma-irradiated, homologous costal cartilage grafts have been previously recommended in the reconstruction of chondral and bony structures such as nasal septum, ear concha, orbital floor, zygomatic bone, frontal bone, or mandible [3,4]. However, we are not aware of any report describing the use of preserved, cadaveric costal cartilage grafts in the reconstruction of the chest wall.

We report herein the feasibility of the use of such a preserved cartilagenous graft to maintain the stabilization of the chest wall in an infant with Poland’s syndrome presenting with paradoxical movement of the chest wall and recurrent pulmonary infections.

2. Case report

An 8-months-old male infant presented with recurrent pulmonary infection and respiratory distress attacks since his birth. On physical examination, apparent paradoxical movement of the chest wall (Fig. 1a), absence of pectoralis major and minor muscles with hypoplasia of the nipple, were observed on the left side. He lacked his left hand, so-called ectromelia. Bilateral rales were audible on auscultation. He was diagnosed to have Poland’s syndrome. There was no history of a familial disease or drug ingestion during pregnancy. Chest X-ray and computerized tomography (CT) revealed absence of left second to fourth ribs with the corresponding cartilages in addition to an ipsilateral hypoplastic lung. Surgical intervention was planned. Overlying skin, consistent with the anatomic curve of the ribs, was incised. Exploration confirmed the absence of the second to fourth ribs and showed no sternal rotation. Chest wall reconstruction was performed with a 5 cm, Tutoplast® Knorpel Costal Cartilage (Biodynamics International, Germany, GmbH) homologous graft (Fig. 1b). The graft was secured with No: 0 polypropylene sutures. Total operation time was 30 min. Optimal chest wall stabilization was maintained and postoperative course was uneventful. The patient is asymptomatic on 3-years follow-up, and control CT revealed an intact graft remaining at the operation site (Fig. 2).
3. Discussion

Assessment of the extent of the chest wall involvement is critical for optimal repair in Poland’s syndrome. Reconstruction is performed for aesthetic concerns with muscle flaps or prostheses, if it is limited to soft tissue including pectoralis muscles and breast [5,6]. Chest wall reconstruction should be performed if the bony thorax is involved and is required in 13.3% of cases [2]. It is mandatory to minimize the concavity if costal cartilages are absent or to eliminate the paradoxic motion and stabilize the chest wall if the patient lacks ribs. Our case showed absence of second to fourth ribs, which is also referred as second to fourth rib syndrome [2].

Numerous materials and techniques have been described for chest wall reconstruction [6–8]. Autogenous cartilage grafts harvested from the contralateral hemithorax [8], might be considered alternatively in the presented case, whereas it was abandoned as to avoid a secondary incision and donor site morbidity, as it offers no improved surgical result. In addition, the frequency of subsequent chest wall deformity and scoliosis, of those undergoing costal graft harvesting for autogenous transplantation, is significantly greater in patients younger than 10 years old [9]. Thus, we preferred a cadaveric costal cartilage graft, which is being used currently in plastic and reconstructive surgery. The use of such a cadaveric cartilage graft was feasible for the chest wall reconstruction for an infant with Poland’s syndrome.

Cartilagenous tissue lacks particular immunologic features and thus allogeneic or autogenous cartilage grafts do not show different histologic differences in the clinical setting. Costal cartilage grafts are readily available with low antigenicity, minimal warping, low infection, extrusion, and resorption rates [10]. They are easy to handle and can be cut into any form as they are formable. Moreover, homologous grafts offer a simple, timesaving, alternative procedure to the more complex surgical approaches with higher morbidity rate.

The use of Tutoplast® Knorpel Costal Cartilage is simple. Following rehydration of the graft with 0.9% saline solution for at least 12 h, it is recommended to wash out the graft with distilled saline solution to remove bacteriostatic additives. Addition of a suitable antibiotic into the soaking solution is reasonable against a possible infection. Thereafter, the graft should be sized and securely fixed to the recipient’s tissue with either absorbable or non-absorbable sutures. Homologous costal cartilage grafts merit consideration in the chest wall reconstruction, particularly in patients with Poland’s syndrome, owing to advantages those, being formable, easiness of implantation, single incision and timesaving procedure.

References


