Pericardial sewing-cuff: an alternative surgical technique for full-root implantation of aortic allograft and pulmonary autograft

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1. Introduction

Aortic root replacement (ARR) is accepted as the technique of choice for aortic allograft (ALG) or pulmonary autograft (PAG) implantation [1-4]. However, haemostatic considerations, coupled with desire to prevent the occurrence of secondary graft ring dilatation have prompted the use of reinforcement techniques for the proximal anastomosis [4-8]. This is achieved by incorporating pericardial or fabric strips externally into the proximal suture line [5-7]. Since 2003, we have used a modified reinforcement technique, in which a graft neo-ring is created by means of a double width pericardial strip. We have found this technique useful for a safer graft implantation and anastomotic haemostasis. In addition, an extended flap of pericardial sewing-cuff allows the reconstruction of certain annuloaortic defects. In doing so, the use of any foreign material or allograft subvalvular tissue is avoided.

2. Technique

The procedure is performed using standard cardiopulmonary bypass with moderate hypothermia, myocardial protection with cold blood cardioplegia.

The subvalvular tissue of the graft is trimmed to about 3 mm away from its sinus nadirs. A strip of autogenous pericardium with a width about 1 cm is seized and folded in two to create a double width U-shaped strip. It is then sewn circumferentially to the subvalvular remnant tissue by placing a double armed 5/0 monofilament in a double running suture fashion and biting the stitches close to the graft basal ring, Fig. 1A. When attempting to repair or reconstruct the aortic annulus, the width of pericardial cuff can be adjusted locally to fit the anticipated defect, Fig. 1B. The graft is then inserted by suturing the pericardial sewing-cuff to the aortic annulus using a 4/0 monofilament running suture, Fig. 1C. The implantation is completed as follows: left coronary ostium reimplantation, distal anastomosis, and right coronary ostium reimplantation.
The reinforcement of proximal suture line in the process of ARR is achieved by incorporating supportive strips into the proximal anastomosis, in an attempt to reduce operative bleeding and provide annular fixation [5–8]. In order to do so, we used a double width pericardial strip to create a graft neo-ring instead of externally incorporating the pericardium into the proximal suture. The pericardial sewing-cuff is sutured close and tightly to the graft basal ring by means of a double continuous running suture. The drawing shows an adjusted flap on PAG aimed to fit a defect in the mitral-aortic curtain. The graft is inserted by suturing the pericardial sewing-cuff to the aortic annulus using a running suture. To ensure an intra-annular sitting, each stitch should nearly cover the total width of the pericardial sewing-cuff. The operative image shows the pericardial sewing-cuff with ALG. By suturing the pericardial sewing-cuff close to the graft basal ring, from its inside, the heterogenous subvalvular remnant tissue is nearly excluded from the graft’s inflow and is replaced by a homogenous and smooth inflow.

3. Comments

The reinforcement of proximal suture line in the process of ARR is achieved by incorporating supportive strips into the proximal anastomosis, in an attempt to reduce operative bleeding and provide annular fixation [5–8]. In order to do so, we used a double width pericardial strip to create a graft neo-ring instead of externally incorporating the pericardium into the proximal suture. The pericardial sewing-cuff is typically made before the institution of cardiopulmonary bypass, except when using PAG, thus we have narrowed the use of this technique with PAG to the situations that require concomitant repair of the aortic annulus.

In these early stages, we experienced no technical problems with performance of the neo-ring (either with ALG or PAG) or with anastomotic bleeding. We have found this modification to be safe, reproducible, and allowing for easier insertion. It may reduce the likelihood of injury for graft leaflets and avoid purse stringing the graft base.

References