A personalized version of teflon felt sandwich technique for acute type a aortic dissection

Bektaş Battaloğlu¹, Barış Akça¹, Nevzat Erdil¹, Cengiz Çolak¹, Olcay M. Dişli¹,

¹ Inonu University Faculty of Medicine Department of Cardiovascular Surgery, MD, Malatya, Turkey

Abstract

Although, there are important technical developments in surgical repair for acute type A aortic dissection, the surgical intervention still carries some difficulties especially when the aortic dissection spreads to the sinuse of valsalva. Here, a modified version of the felt sandwich technique is described in order to support the entire aortic root externally and overcome bleeding without causing any aortic stenosis.

Keywords: Aortic dissection, ascending aorta, reinforcement
Introduction

Type A aortic dissection is a highly life-threatening disease often ending in mortality due to aortic rupture and organ malperfusion. Surgical intervention is the only recommended treatment modality in such cases though it still bears unresolved problems causing mortality and morbidity. Although there is an expanded list of considerable surgical obstacles, aortic root repair remains a challenging problem among these surgical difficulties especially when the aortic dissection extends to the sinuse of valsalva. Furthermore, suturing for the anastomosis of the affected and weakened aortic root due to dissection will cause further damage that might result in uncontrollable surgical bleeding. To solve these problems, numerous valuable surgical techniques were introduced including reinforcement with one or two strips of Teflon felt, glue fixation, supporting partial and entire aortic root with graft, and modifications of the latter. 1-7

There are, however, some advantages and disadvantages in each of these options. In the traditional felt sandwich technique, the dissected aortic layers are reunited between two strips of Teflon felt (8- to 10-mm wide) provided that the coronary ostia are not compromised. In this study, we present a personalized version of the felt sandwich technique in order to support the entire aortic root externally without causing any aortic stenosis.

Technique

Following the cardiopulmonary bypass initiation and cross-clamping, an aortotomy is applied and the ascending aorta is transacted just at the supracoronal level. Regardless of the presence of dissection extending to the sinuse of valsalva, aortic root is reinforced with the felt sandwich technique in case there is no aortic valve pathology. Unlike the traditional technique, two Teflon strips with non-identical width is prepared; these two strips are approximately 5-mm wide and 12-mm or wider, respectively (Figure 1A).

Avoiding contact with the origin of the coronary arteries, aortic root is slightly mobilized for the strip application by way of limited excision. The origin of the coronary arteries and surrounding tissues are left untouched in order to prevent potential iatrogenic traumas and further weakening while avoiding strip pressure over the coronary arteries. Then, the wider Teflon strip is placed outside the aortic circumference in order to cover the entire aortic root wall externally. Following this, the 5-mm wide strip is placed inside the aortic circumference. The aortic walls are sandwiched between the felt strips with a horizontal mattress by using 4-0 polypropylene sutures. While placing the horizontal mattress sutures, sutures are applied from the upper side of the outer strip and the mid-point of the inner strip (Figure 1B, Figure 2). While placing the aortic replacement graft, 3-0 polypropylene running sutures

![Figure 1: (A) Teflon strips with non-identical; approximately 5-mm wide and 12-mm or wider. (B) The thin strip is placed inside the aorta and the horizontal mattress sutures are applied from the upper side of the outer strip and the mid-point of the inner strip.](image)
pass through the bottom line of the inner strip and the 
brim of the outer strip, which prevents aortic stenosis 
caused by curled up inner strip (Figure 3A). In other 
words, if sutures go through the upper or mid-line of 
the inner strip instead of stabilizing the bottom of the 
strip, the strip will eventually bend inwards and cause 
discrete like stenosis (Figure 3B). As the sutures pass 
through the upper line of the outer strip, the strip is let 
reach down to the root base. In this way, the strip exter-
nally supports the entire aortic root (Figure 3A).

Discussion

If aortic dissection patients have normal aortic valve 
with undilated or mildly dilated annulus, surgeons of-
ten prefer supracoronary graft replacement due to its 
technical simplicity and less invasive nature. However, 
aortic dissection mostly spreads to the aortic root re-
sulting in weakened wall. There may even be additional 
etiological connective tissue disorders that might fur-
ther weaken the aortic root wall.

Without one of the reinforcement techniques, prox-
imal anastomosis of this area may cause uncontrollable 
blooding and late postoperative aortic root dilatation 
along with progressive aortic regurgitation. To over-
come these problems, many techniques ranging from 
the simplest methods such as the sandwich technique to 
more complicated approaches like Florida sleeve tech-
nique and its modified versions, which create a neo ad-
ventitia, have been suggested to support the aortic root 
and anastomotic area.1,2

Although these techniques offer effective solutions, 
Florida sleeve technique, its modifications, and similar 
techniques are time consuming and invasive methods. 
On the other hand, sandwich technique, simple as it is, 
may prove to be ineffective as it fails to support the entire 
aortic root causing surgical bleeding and late root dila-
tation. Traditionally, the dissected aortic layers are reu-
nited by placing thin felt strips (8- to 10-mm wide) from 
inside and outside the circumference of the aorta without

Figure 2: Surgical view of the sandwiched aortic root.

Figure 3: (A) Running 
sutures pass through the 
bottom line of the inner 
strip and the brim of the 
outer strip and so the outer 
strip reaches down to the 
root base. (B) If sutures go 
through the upper or mid-
line of the inner strip, the 
strip will bend.

Technical Note

compromising the coronary ostia. In this method, however, the entire aortic root may not be supported.

Furthermore, this method may cause aortic stenosis if running sutures go through the upper or mid-line of the inner strip instead of stabilizing the bottom of the strip, which brings about a curled up inner strip and, therefore, discrete like stenosis. To prevent curling up inner strip I prefer a thinner strip (approximately 5-mm wide) instead of a traditional wider strip and take care to pass sutures through the bottom line of the strip. Safi et al. recommend a technique of interrupted pledgeted horizontal mattress sutures compared to the felt sandwich technique. In their experience, this provides superior stabilization and decreases risk of subsequent aortic stenosis.8

In this personalized felt sandwich technique, the aim was to develop the reinforcement effect of the sandwich technique and strengthen the entire aortic root wall externally so as to avoid uncontrollable bleeding and late root dilatation. In this way, the proposed modification also prevents aortic stenosis during surgery. Meanwhile, the original simplicity and applicability of the sandwich technique is preserved as well. This personalized method may also be applied to patients with ascending aortic replacement without dissection disorders.

Conclusion

The suggested modification to the felt sandwich technique is a simple and effective way of supporting the aortic root externally as it also helps avoid bleeding.

References


Received: 28/11/2016
Accepted: 11/02/2017
Published: 15/03/2017

Disclosure and conflicts of interest:
Conflicts of interest were not reported.

Corresponding author:
Dr. Bektas Battaloglu
Mail: bektas.battaloglu@inonu.edu.tr