Letters to the Editor

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Adjusting the indication to polydioxane suture for elective sternal closure

To the Editor:

We read with great interest the report by Dr Usui and coworkers.¹ They reported a large series of 350 patients who had the sternum closed electively with 1-0 polydioxane (PDS; Ethicon, Inc, Somerville, NY) cord suture. They recorded 3 cases of late sternal dehiscence resulting from filament fracture; in 2 they were obliged to carry out sternal refixation in the operating room. One of these patients was obese. As the article photographically demonstrates, the mechanism of rupture involved the filament being torn off by the bone edge. Hence the authors questioned the reliability of PDS in elective sternal closure.

In past years we have had much experience with the use of PDS cord in the elective closure of median sternotomy in patients undergoing cardiac surgery. The complication reported by Usui and colleagues has already been pointed out in a previous article by van Sterkenburg, Brutel de la Riviere, and Vermeulen,² who then suspended the use of PDS. In our opinion, the rupture of the suture and the following sternal dehiscence are linked mainly to the force traction applied to the wires. In turn, the latter depends on body size of the patient. We had excellent results with PDS cord suture in elderly, female, petite patients with body surface areas less than 1.5 m² and at least one risk factor for aseptic sternal dehiscence, including osteoporosis, renal insufficiency, diabetes, and chronic pulmonary disease (Figure 1). This is a subgroup of individuals who frequently have fragile, waferlike, osteoporotic sternal bone, and the probability of steel wire cutting through the bone is high. Among these patients, the PDS sternal suture is more protective against median sternotomy complications than are steel wires, and it reduces the risk of dehiscence and sternal splitting caused by bone cutting. We had a lower incidence of aseptic sternal dehiscence and no cases of PDS wire fracture in

Figure 1. Intraoperative view of PDS suture placement through thin and fragile sternum.

this subset of patients.³ Conversely, among patients with slightly bigger body surface areas (above 1.7 m²), the PDS cord could be used in conjunction with common steel wires. Additionally in our experience, after open-wound treatment of mediastinitis,⁴ PDS cord has proved suitable for sternal approximation and bilateral pectoralis major muscle flap plasty (as formerly described by Perkins and associates⁵) with no instances of recurrent dehiscence or infection in nearly 50 cases.

Our experience indicates that the occurrence of some cases of fractured PDS suture in a general surgical population should not be a drawback to the liberal use of absorbable suture for elective sternal closure in petite patients. To avoid complications, it is pivotal that candidates to undergo closure with PDS be properly selected. In the obese, the closure of the sternum with PDS is clearly unsafe. Conversely, subgroups of patients exist in whom sternal closure with PDS would be advantageous. In conclusion, Usui and colleagues should be congratulated for their work, which elucidated the limitations of indiscriminate use of PDS for sternal approximation and will help to refine the indications.

Nicola Luciani, MD
Amedeo Anselmi, MD
Gianfederico Possati, MD
Department of Cardiac Surgery

Catholic University of the Sacred Heart
Rome, Italy

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Reply to the Editor:

Dr Luciani and coworkers have proposed an indication of polydioxane (PDS) sutures for elective sternal closure, indicating that candidates to undergo closure with PDS cord (Johnson and Johnson Co, Ltd, New Brunswick, NJ) must be properly selected. A PDS sternal suture shows a protective effect against steel wire cutting through the bone in a subgroup of elderly, female, and petite patients without PDS filament fractures. Therefore, this subgroup is a good candidate for PDS sternal closure. For patients with slightly larger body surface areas, the PDS cord could be used together with steel wires to avoid PDS filament fractures. Patients who have had open wound treatment of mediastinitis are also good candidates. Absorbable sutures have the advantage of protecting against recurrent infection.

PDS sternal sutures have both advantages and disadvantages. PDS sutures are suitable for fragile and osteoporotic sternum to avoid bone cutting and might be effective for infected sternum because of its absorbability. But PDS sutures carry the risk of filament fracture caused by abrasion injury with the bone edge and gradual reduction of tensile strength after use in the

body. Manufacturer data show that the tensile strength decreased 50% to 65% of the previous value at 3 weeks and 30% to 40% at 6 weeks after implantation. Therefore, heavy polyester synthetic sutures are recommended to protect sternal splitting by bone cutting for bigger patients. The company has a newly developed PDS cord that is 1.5 mm in diameter with nearly twice the tensile strength (380 N) of PDS cord that is 1.0 mm in diameter (180 N). It should have sufficient strength, even several weeks after implantation. The sternal closure technique is another way to avoid PDS filament fracture. The figure-eight technique, in which the PDS suture is inserted just beside the sternum body above and below the intercostal space, should also increase the stability of sternal fixation and reduce tensile strength for each PDS suture. An absorbable sternal fixation pin (superFIXSORB; Johnson and Johnson Co, Ltd, Tokyo, Japan) is also helpful to increase the stability of sternal fixation (Figure 1).

We agree with the adjusting indication for PDS sutures proposed by Dr Luciani and coworkers. Absorbable sutures, such as PDS cord, have many advantages for elective sternal closure. PDS sutures should be used with an understanding of its disadvantages, and the figure-eight technique and PDS cord of 1.5 mm in diameter might expand its indication.

Figure 1. The figure-eight technique and an absorbable sternal fixation pin. PDS sutures are inserted just beside the sternum body above and below the intercostal space. Absorbable sternal fixation pins are placed in the sternal manubrium and body. PDS, polydioxane.

Akihiko Usui, MD

Yuichi Ueda, MD

Department of Cardiac Surgery
Nagoya University Graduate School
of Medicine
Nagoya, Japan

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Right ventricular remodeling

To the Editor:

The *Pediatric Cardiac Surgical Annual* for 2006 contained an article on remodeling surgery,¹ in which the claim was made that the surgical concept is based “on the anatomic features described by Torrent-Guasp et al.” We find this disturbing since, to the best of our knowledge, Torrent-Guasp and his colleagues have never studied the arrangement of the ventricular myocytes in the human right ventricle. Furthermore, although receiving increasing attention from surgeons working in the arena of acquired cardiac disease, their findings in animal hearts have never been validated by independent anatomic investigators. Thus, we would question the wisdom of basing surgical procedures on such a flimsy anatomic foundation. It is noteworthy that, in a recent supplement to the *European Journal of Cardio-thoracic Surgery*, Kocica and colleagues² state, “Under no circumstances is the attachment of the entire ventricular mass, which extends from the pulmonary artery on the one side and to the aorta on the other, considered to perform its “skeletal-muscle-like-contraction.”” Despite this statement, at no stage do Kocica and colleagues explain how the ventricular myocardial mass is compartmented so as to produce the “helical band.” Indeed, throughout the supplement, very many authors illustrate this purported helical band, yet in our own contribution to the supplement,³ we showed how, although it is possible to unravel the ventricular myocardium in the form of the helical band, there is no orderly arrangement of the myocardial aggregates within its alleged compartments. In our opinion, therefore, it is both dangerous and foolish to propose concepts for restorative surgery on the basis of unvalidated anatomic concepts. This is more so since del Nido and associates¹ chose to ignore a study specifically devoted to the orientation of the myocardial aggregates in tetralogy of Fallot,⁴ which lends no support to the concept of the “helical ventricular myocardial band.”