Comment to ‘The Quick simple clamping technique for the repair of descending aortic aneurysm’

Jean Bachet*

Department of Cardiovascular Surgery, Paris Institut Mutualiste Montsouris, 42 Bd Jourdan, 75674 Paris, France

In this chapter of the MMCTS, Biglioli and co-workers propose and describe an original and apparently bold technique for replacing the thoracic aorta that they have named the ‘Quick simple technique’ and that they designate as a ‘variation’ of the classical ‘clamp and sew’ technique described by E. Stanley Crawford several decades ago [1].

Such a label is obviously too modest. Even at rapid analysis, the method appears, indeed, as based on a totally new concept with nothing much in common with the old and traditional mode of just clamping and sewing.

Four features constitute the pillars on which this surgical technique is built:

1. The ligature and severing of all the intercostal arteries arising from the aneurysm before any attempt to cross-clamp the aorta;
2. The absence of opening of the aneurysm during the performance of the proximal anastomosis;
3. The fastest possible making of both proximal and distal anastomoses which are supposed to be completed in less than 20 min;
4. The absence of any kind of distal perfusion during the time of aortic exclusion.

The idea of the ‘intercostal ligature first’ technique is based on important anatomical and physiological studies carried out previously by the authors who could definitely demonstrate that blood is supplied to the spinal cord and, in particular, to its motor elements by a continuous arterial system [2]. This system is fed by the vertebral arteries, by branches of the intercostal and lumbar arteries and by tributaries of the hypogastric network. In this system, the Arteria Radicularis Magna, best called the Adamkiewicz artery which, for decades, was considered as the paramount anatomical blood supply to the spinal cord is only one, though important, constituent of the arterial network.

Therefore, progressively occluding and severing the intercostal arteries arising from the aneurysm, without opening it, may have two main advantageous consequences. On the one hand, it may open collateral paths which are not normally functional and might provide to the neural tissue a certain type of preconditioning. On the other hand, the fact that the aneurysm remains closed during this sequence of the procedure prevents the patent intercostal arteries from back bleeding and, consequently, avoids any kind of ‘steal’ syndrome to the cord.

This concept is in complete accordance with the ideas developed and published by Griepp as early as 1996 [3] and which he recently summarized elegantly as the ‘Collateral Network Concept’ [4].

Such a concept is of major importance. It, indeed, marks the rupture with the traditional and almost obsessing view of the spinal cord blood supply in anatomical terms solely. Consequently it may induce the development of surgical procedures elaborated more from a physiological standpoint than from a purely vascular one. Such a change is presently illustrated by the widely demonstrated benefit of cerebro-spinal fluid (CSF) drainage during and in the immediate aftermath of surgery of the thoracic and thoraco-abdominal aorta and its integration as a major advance in the therapeutic armamentarium.

Both Biglioli’s and Griepp’s groups have applied the ‘collateral network concept’ in their clinical activity.
during the last decade and have gathered impressive experiences in terms of low rates of mortality and spinal cord injuries [5].

The mortality rate of 4% and the spinal cord injury rate of 2% in almost 200 patients reported here by Biglioli are, beyond any doubt, among the lowest ever published.

Nevertheless such a concept and, moreover, its systematic application in daily routine might require one word of caution as it could encompass a few hazards.

In a recent experimental study, Etz et al. have demonstrated in a porcine model that all the intercostal and lumbar arteries could be tied up without leading to paraplegia [6]. However, unlike the experimental animals, most patients undergoing thoracic or thoraco-abdominal aortic surgery have either heavy atheromatous or chronically dissected aortas. In such patterns the intercostal and lumbar arteries are often occluded or torn and their participation in the spinal collateral network is either null or severely compromised. Therefore, occluding the few arteries which are critical to the spinal blood supply may induce irremediable or at least impeding ischemia. Griepp and co-workers have, indeed, shown that, beyond the suppression of 10 pairs of intercostal and lumbar arteries, the rate of paraplegia was sharply increasing [3]. It seems sound, so far, to limit the use of the concept and technique described in the present report to aneurysms totally located in the thorax and limited in extension, as advocated by the authors. Similarly, it is probably wise to re-implant the intercostal arteries if a previous abdominal aortic replacement was performed or if, for any reason, the left sub-clavian artery has been occluded.

Another point to wonder about is the limit of time allowed to performing both anastomoses. Biglioli insists that they must be completed within 20 min as it is demonstrated that this represents the time of exclusion that can be harmlessly tolerated by the spinal cord. In most instances this may, indeed, be enough. But this demand could be a dire limitation to the use of the method. Firstly, because all surgeons are not equally skilful or fast and some would never complete two aortic anastomoses in such a reduced limit of time. Secondly, because, from time to time, unexpected or unforeseen technical difficulties may arise compelling the surgeon to cross-clamp the aorta for longer times or demanding several periods of aortic cross-clamping.

This point leads us to the most questionable feature of the present technique: the absence of distal perfusion during the duration of aortic cross clamping.

Because of the necessity of an extra-corporeal circuit, vessels cannulation, use of heparin, and so on, the authors have chosen not to use such an adjunct. Their results seem to prove them right. However, the rationale for not using such a protective adjunct is not quite convincing. It is clearly demonstrated that distal perfusion during aortic exclusion is a most beneficial method in preventing spinal cord ischemia, especially when dealing with extended lesions. In addition, in case of isolated thoracic aneurysm, a left heart bypass may be used which implies easy cannulation of one left pulmonary vein or the left atrium and the distal aorta or a femoral artery, limited quantity of heparin and reduced bleeding risk. Overall, it allows the maintenance of the spinal arterial network perfusion by the lumbar and hypogastric arteries during the whole clamping time, especially when surgical difficulties make it longer than expected. One may, therefore, question its avoidance considering that, without it, some patients may be put at undue risk of severe complication.

Nevertheless, the method described in the present report is of great interest as it is based on a very innovative concept supported by insightful experimental studies and which has led, through an important and undisputable clinical experience, to outstanding results. For both those accomplishments the authors are certainly to be commended.

References


