To Repair or Replace- The Root Dilemma in Aortic Dissections

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Abstract

Significant dilemma exists regarding management of the aortic root pathology in acute aortic dissections. Several strategies for both repair and replacement exist and there is a lack of clarity on the superiority of one over the other. Important factors that influence management strategies include involvement of the sinuses, competence of the aortic valve, presence of Marfan's syndrome and connective tissue disorders, as well as availability of surgical expertise. The wide variability in these factors makes it unlikely for any one technique to be suitable for management of all aortic roots and the root pathology has to be tailored to an individual patient.

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AbstractSignificant dilemma exists regarding management of the aortic root pathology in acute aortic dissections. Several strategies for both repair and replacement exist and there is a lack of clarity on the superiority of one over the other. Important factors that influence management strategies include involvement of the sinuses, competence of the aortic valve, presence of Marfans syndrome and connective tissue disorders, as well as availability of surgical expertise. The wide variability in these factors makes it unlikely for any one technique to be suitable for management of all aortic roots and the root pathology has to be tailored

to an individual patient. Management of the aortic root pathology in acute aortic dissection involving the thoracic aorta has been the subject of considerable interest and controversy and the study by Percy et al examines the strategies for this clinically relevant issue in a large nationwide analysis. (1) Percy et al in their study have divided these strategies broadly into two groups- those where the aortic valve was spared and those where it was replaced. However, the authors have not specified the various interventions that fall under these two groups. For instance, aortic valve replacement can be carried out separately with a supracoronary replacement of the ascending aorta as well as a composite root replacement. The former is a much simpler operation than a composite root replacement, and it would be important to note if these patients were treated as one and the same, as in both cases the aortic valve would be replaced. Similarly, aortic valve repair group can potentially include valve resuspension as well as valve sparing root replacements, as in both cases the valve is spared but the two interventions are technically at the two ends of the surgical expertise spectrum. Thus, comparing outcomes under the headings of aortic valve repair or replacement may lead to outcomes that are hard to be generalized. A more clinically oriented way to group these patients would be to identify who require a root replacement and those who do not. This can be followed by an intra-group comparison of different techniques for root replacement and those where no root replacement or limited repair can be carried out. A root replacement is indicated in the presence of gross dilatation or destruction of the sinuses of Valsalva, Marfans Syndrome, annuloaortic ectasia or presence of intimal tear in the aortic root with or without involvement of the coronary arteries.(2,3) The root replacement can be the more conventional composite root replacement (modified Bentall) with a mechanical valve in situ or in younger patients, with essentially normal aortic valves, the valve sparing techniques can be used (4,5). The valve sparing root replacements can again be carried out using two different techniques, aortic root remodeling technique (Yacoub)(6) or the reimplantation technique (David)(7). Extensive comparisons have been drawn between the composite aortic root replacement and valve- sparing root replacement for management of the aortic root that has resulted in several systematic reviews and meta-analysis, often with conflicting observations.(8–12) A valve-sparing root replacement precludes the need to take oral anti-coagulants, however composite valve-related complications have been found to be similar among the two strategies(9) Another study reported that the risk of endocarditis was lower with valve-sparing techniques but it was associated with a higher rate of reoperations compared with composite root replacements.(11) Others have reported lower incidence of thrombo-embolic events and similar durability of repair with both the strategies.(13) Repair techniques can include several surgical strategies where both the aortic valve and the sinuses (resuspension) are preserved, or the sinuses are partially replaced (Uni Yacoub procedure). When the aortic valves are normal, aortic regurgitation is essentially due to changes in the aortic root anatomy and can be easily addressed by valve resuspension which is a relatively simple, yet quite an effective strategy. (14) Valve resuspension is carried out in conjunction with repair of the dissected aortic root and several techniques have been used to repair the dissected ascending aorta. This includes Teflon-felt based repair techniques or glue-based techniques either in isolation or in combination. The two well recognized Teflon based technique includes formation of the “neo-media” and the “sandwich technique”. In the neo-media technique Teflon-felt is inserted between the intima and the adventitia thus replacing the dissected media. The alternative technique is the sandwich technique where a Teflon-felt strip is placed circumferentially along the inside and the outside of the aortic wall. Gelatin-Resorcinol- Formaldehyde-(GRF) glue and Bioglue have been used along with Teflon-felt repair as well as in in isolation to approximate the aortic walls. Long-term durability of the aortic root repair is a concern when GRF or Bioglue are used in isolation.(14) Uni-Yacoub is another repair technique where the dissection involves only the noncoronary sinus of Valsalva and limited excision of the sinus is performed. (5) Depending on the repair technique there is significant variability in outcomes. While the freedom from re-operation with the “neo-media” and the “sandwich” technique has been reported to be 89% and 79% respectively at 15 years. (15,16), the 10-year freedom from reoperation with GRF alone is only 69%.(17) The question whether limited root repair in aortic dissections is preferrable to root replacements has been examined by several studies. The discussion around the choice of technique mainly focusses on two considerations. Firstly, does a more extensive root replacement leads to an increase in early mortality and in the longer term does it produce a more durable repair? If it leads to a more durable repair, can increased early mortality be an acceptable trade-off? Proponents of aortic repair suggest that

hospital mortality is of paramount importance and hence a more conservative repair may be preferrable in most cases. (4,18) However, it is increasingly been shown that more extensive root replacement techniques do not increase the risk of early mortality. (19–22) However, it must be borne in mind that most of these series are reported from high volume centers and whether the results seen in these studies are reproducible at all institutions remain questionable. On the question of durability of repair while there is some evidence that root repair results in an increase in the risk of reoperation(21) most studies show no difference in durability in the longer term (17,19,20,22) perhaps due to lower survival rates among these patients compared with age- and gender-matched controls.(20) Thus, it becomes obvious that in experienced hands root replacement does not pose any additional risk, however, there is also no overwhelming evidence of it being more durable than limited repair. So, experience with the technique may be the key for a successful short-term outcome. From a practical point of view the question that ought to be asked is- when to replace the aortic root in an aortic dissection and when can we leave it alone. Younger age, intimal tear involving the aortic root with or without involvement of the coronaries , dilated aortic root (>4.5cm), Marfans Syndrome are some of the indications where more aggressive root replacement is mandatory. (3,17,20,22). When a decision to replace the root has been taken the choice of the technique of root replacement composite or valve-sparing, must be guided by the pathology and the surgical experience. If root replacement is not required, the next step is to assess if the aortic valve is incompetent and/or diseased and resuspension or a separate aortic valve replacement could be carried along with supra-coronary replacement of the ascending aorta. The conflicting results with the same technique highlights the variabilities that exist in terms of extent of aortic damage, the type of disease as well as the surgical expertise which may have a greater impact on the outcome rather than the technique itself. Percy et al must be congratulated for carrying out this clinically relevant study and concluding that that "in selected cases' repair can be carried out. Management of the aortic root in aortic dissections is a complex problem and generalizing a treatment option of either aortic root replacement or repair would be erroneous. The management strategy must be individualized considering the patient, the pathology, and the surgeon expertise.

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that, in the treatment of acute

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