Surgery of Acute Type A Dissection: What Have We Learned during the Past 25 Years?

Jean Bachet,*1 Bertrand Goudot,*2 Gilles Dreyfus,*2 Denis Brodaty,*3 Claude Dubois,*2 Philippe Delenodereecker,*2 Feirouze Teimouri*2 and Daniel Guilmet*4

Every acute dissection involving the ascending aorta (Stanford type A) must undergo emergency surgical repair. However, the surgical techniques must vary according to the clinical presentation of the patients or the anatomical patterns observed. Furthermore, surgery is generally difficult because of the poor condition of the aortic tissues. To reduce those difficulties many technical artifacts have been described. In 1977, we have proposed the use of Gelatin-Resorcin-Formalin (GRF) biological glue to reinforce the suture areas.

From January 1977 to July 1999, 212 patients (152 males and 60 females) aged from 15 to 80 years (mean age: 54±11 years) underwent an emergency operation for type A aortic dissection. One hundred seventy-eight patients (84%) were operated on within 4h after being referred to the hospital. Twenty-eight patients (13.2%) had Marfan's syndrome. In 44 patients (20.7%), the aortic valve was replaced either independently (6 cases: 2.8%) or by means of a composite graft (38 cases: 17.9%). Because of the location of the intimal tear, the aortic replacement was extended to the transverse arch in 61 patients (28.7%).

Hospital mortality amounts to 21.6% (46 patients), 25% in patients with arch replacement and 19.4% in patients without arch replacement (n.s). Analysis of hospital mortality demonstrates that the main causes of death were cardiac tamponade, neurologic disorders and visceral malperfusion. One hundred sixty-six patients were discharged and surveyed from 5 months to 22 years postoperatively (Mean follow-up: 85±66 months). During this period of time, 25 patients (15%) had to be reoperated on for a total of 33 reoperations. Seven patients (28%) died at reoperation. At univariate analysis, presence of Marfan's syndrome (p<0.05) and absence of arch replacement (p<0.02) were determinant risk factors for reoperation. Emergency (p<0.01) and thoraco-abdominal replacement (p<0.04) were determinant risk factors of death at reoperation. The freedom from reoperation (Kaplan-Meier, CI: 95%) is: 96% (90-98), 87% (79-92), 80% (70-88), 66% (51-78) at 1, 5, 10, and 15 years, respectively.

A total of 39 patients (24.3%) died during follow-up. Presence of Marfan's syndrome (p<0.01), reoperation (p<0.02), stroke (p<0.05), cardiac failure (p<0.05) were determinant risk factors of late mortality. The late survival rate (K-M. C. I.: 95%), including hospital mortality, is 71% (64-77), 66% (58-73), 56% (47-64), 46% (36-56), 37% (28-44) at 1, 10, 15, and 20 years respectively.

During this experience extending over more than 23 years, the GRF glue has proved to be extremely useful, making the procedure much easier and safer. Nevertheless many factors appeared of importance in the pre, intra, and postoperative management of the patients. Cardiac tamponade and visceral malperfusion must be properly diagnosed and treated. During aortic repair, the main intimal tear must be resected. The transverse arch must be checked and replaced whenever necessary. The aortic valve should be preserved whenever possible. During CPB, perfusing the aorta in the regular antegrade way seems to dramatically reduce the rate of malperfusion. The quality of the first emergency operation seems to have


*1 Institut Mutualiste Montsouris, Boulevard Jourdan, 75014 Paris, France
*2 Hopital Foch, Suresnes, France
*3 Centre Cardiologique du Nord, Saint-Denis, France
*4 Clinique de la Roseraie, Aubervilliers, France

a major influence on the late results, especially concerning the rate of late reoperations and aortic ruptures. However, those late results depend also on the patient's basic condition, particularly in Marfan patients.

There is presently within the surgical community a total consensus in considering that acute dissection involving the ascending aorta requires urgent and undelayed surgical treatment as the patients, either untreated or medically supported, are threatened to die from cardiac tamponnade and/or massive aortic regurgitation and/or major malperfusion. But the surgical repair remains often uncertain and peppered with technical difficulties mainly due to the poor quality of the tissues, the unsafe sutures and, therefore, the possibly catastrophic consequent hemorrhages.

This stems from two main causes:
1) the extension of the dissecting process along the vessel with the risk of severe ischemia or sudden rupture;
2) the weakness of the dissected tissues, responsible for insecure sutures, copious bleeding and prolongation of cardiopulmonary bypass, massive blood transfusions and frequently complicated postoperative course.

In order to reduce those deleterious difficulties, a great number of technical artifacts and procedures have been imagined and developed. In 1976, one of us (DG) discovered the Gelatine Resorcinol Formaline Glue by accident\(^1\). We, like many others, were facing at that time the operative difficulties of surgery of acute dissection. The idea of using such a sealant to reinforce the weak tissues and achieve immediate blood tightness of the sutures, as already suggested by Anagnostopoulos\(^2\) was immediately attractive.

The clinical use of this adjunct started in January 1977\(^3\). Since then, it has been utilized in all patients referred to us for emergency surgical repair of acute dissection involving the ascending aorta\(^4-6\).

This article reports our experience with the GRF Glue. In the first part we shall briefly report the immediate and long-term results obtained in 212 consecutive patients operated on for Type A acute aortic dissection over a 23-year period of time. In the second part we shall try to address and analyze the problems that we have faced during this experience and which have progressively determined our present ideas concerning this dreadful disease and its surgical management.

Patients

Between January 1977 and March 1999, 212 unselected consecutive patients suffering from acute dissection involving the ascending aorta were operated on. There were 152 males and 60 females whose ages ranged from 15 to 79 years with a mean of 53+14 years. Operations were performed within 15 days after the onset of symptoms and in 173 patients (82%) within 48 h after the initial chest pain. Our policy has been to operate on the patients as soon as possible after their arrival in the Department. So, 184 patients (86%) were operated on less than 4 h after their arrival.

In all cases the ascending aorta was involved in the dissecting process. Ninety patients (42.6%) had preoperative chronic arterial hypertension. Twenty-eight patients (13.7%) had a more or less severe Marfan's syndrome. One hundred one patients (49.8%) had atheromatous arterial lesions. In the remaining patients no clinical risk factor was present but postoperative histological examination demonstrated Marfan-like degenerative lesions of the aorta. In 8 patients, the dissection was secondary to a previous cardiac operation.

The preoperative clinical condition of the patients is summarized in Table 1.

The entry site was located in the ascending aorta in 144 patients (68.1%), in the transverse arch in 61 patients (29.4%) and in the descending aorta (retrograde dissection) in the remaining seven patients (3.4%). Forty-eight patients (23%), including those with annulo-aortic ectasia, had
an abnormal aortic valve prior to the dissection.

### Results

In most patients, the surgical procedure was simple and surgical hemostasis was easily obtained. The duration of cardiopulmonary bypass ranged from 60 to 210 min, with an average time of 103 min; the duration of aortic cross-clamping ranged from 43 to 160 min with an average duration of 71 min; in patients undergoing a replacement of the transverse arch the duration of circulatory arrest ranged from 15 to 57 min (mean: 31 min).

The aortic repair consisted in replacing the ascending aorta in 212 patients (100%). The prosthetic replacement was extended to the transverse arch in 61 patients (29.4%). Fifty patients (24%) had a replacement of the aortic valve, either separately (6 cases: 3%) or by means of a composite graft (38 cases: 18%). Six patients had a valve-sparing Yacoub's procedure. The GRF glue was used in all patients either on the proximal or the distal aortic stumps or on both.

Twelve deaths (5.6%) occurred in the operating room and 34 patients (16%) died in the intensive care unit, resulting in a hospital mortality rate of 21.6%. In 16 patients (8%) death was related to neurologic disorders, in 6 (3%) to isolated low cardiac output and in 12 (6%) to multiorgan failure. Post operative complications are summarized in Table 2.

The operative risk was higher but not significantly in patients undergoing replacement of the transverse arch (15 out 61: 24.5%) than in patients undergoing replacement of the ascending aorta alone (31 out 151: 20.5%).

Concomitant replacement of the aortic valve either separately or with a composite graft, had no influence on the mortality rate.

One hundred-sixty-six patients were discharged from hospital and surveyed for 2 months to more than 20 years. The average follow-up duration is of 86±66 months and the cumulative follow-up is of 926 years. Eight patients (3.8%) have been lost to follow-up.

Forty-one patients (24.6%) died during follow-up. The cause of death is summarized in Table 3. Presence of Marfan's syndrome (p<0.01), reoperation (p<0.02), stroke (p<0.05), cardiac failure (p<0.05) were determinant risk factors of deaths at univariate analysis.

Thus, the actual survival rate (Kaplan-Meier. Confidence interval: 95%), including hospital mortality, is: 71.5% (63.4-77.8), 66% (58.3-73), 56.4% (47.7-64.7), 46.3% (36.4-56.5), 35.7% (28.6-37.9) at one, 5, 10, 15, and 20 years, respectively.

The clinical condition of the 118 remaining patients (55.6%) is satisfactory. Seventy-one patients (56.8%) are in functional class I or II and many of them have resumed their previous occupation or activity.

### Table 1 Preoperative condition.

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>N</th>
<th>%</th>
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<tr>
<td>Arterial hypertension</td>
<td>90</td>
<td>42.4</td>
</tr>
<tr>
<td>Marfan's syndrome</td>
<td>28</td>
<td>13.2</td>
</tr>
<tr>
<td>Previous cardiac procedure</td>
<td>8</td>
<td>3.7</td>
</tr>
<tr>
<td>Clinical condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiogenic shock</td>
<td>86</td>
<td>40.5</td>
</tr>
<tr>
<td>Neurologic disorders</td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td>Myocardial ischemia</td>
<td>19</td>
<td>9</td>
</tr>
<tr>
<td>Limb ischemia</td>
<td>33</td>
<td>15.5</td>
</tr>
<tr>
<td>Aortic regurgitation</td>
<td>103</td>
<td>49</td>
</tr>
<tr>
<td>Time of surgery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;48 h after onset of symptoms</td>
<td>173</td>
<td>82</td>
</tr>
<tr>
<td>&lt;4 h after hospitalization</td>
<td>184</td>
<td>86</td>
</tr>
</tbody>
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Ten patients (8%) have mild to moderate aortic regurgitation which is medically supported. Eight patients (6%) suffer from neurologic sequels (3 paraplegia, 2 hemiplegia and 3 visual disorders).

Reoperations

During this period of time, 25 patients (15.5%) had to be reoperated on for a total of 33 reoperations. Seven of those patients (28%) died at reoperation. At univariate analysis, presence of Marfan's syndrome (p<0.05) and absence of arch replacement (p<0.02) were determinant risk factors for reoperation. Emergency (p<0.01) and thoraco-abdominal replacement (p<0.04) were determinant risk-factors of death at reoperation. The actuarial freedom from reoperation (Kaplan-Meier, CI: 95%) is: 96.05% (90.9-98.2), 87.6% (79.8-92.7), 80.9% (70.8-88.1), 66.4% (51.1-78.9) at one, 5, 10, and 15 years, respectively.

Comments

Through the analysis of those results, some elements have appeared or been stressed out that, in our opinion, form the core of our present therapeutic strategy of acute type A dissection.

First of all one may say that the first goal of the emergency surgical procedure, that is preventing the patients from death from tamponnade, major malperfusion or massive aortic regurgitation has been achieved. Indeed, the extreme severity of the prognosis of acute dissection involving the ascending aorta, either untreated or medically supported, has been dramatically reduced and the 30 days mortality rate decreased from about 80% to about 15 to 30% after surgery. But the most important observation is that the surgical results have not improved much in the last two decades. Indeed, in the present study, the 21% hospital mortality rate is not very low and, furthermore has not changed for 15 years. Similarly, Fan and coll. from the Stanford group recently reported their experience of aortic dissection over 30 years7). In their experience, the hospital mortality decreased to a nadir of about 15% between 1977 and 1982. But, this mortality rate increased in the ensuing years and has presently stabilized to 26%. The authors acknowledge that the low mortality observed previously was probably the result of chance or some other imponderable factor and that the present mortality rate is more realistic that the one reported earlier.

So, the primary surgical purpose has been achieved but imperfectly. This is due partly to non surgical factors. Many patients are indeed referred to surgery in cardiogenic shock or severe circulatory impairment. Two features which are not always properly managed are mainly responsible for this: tamponade and malperfusion.

Tamponade, is present in most cases. It does not always mean aortic rupture since, in many patients, it is the result of blood oozing through the weak outer layer of the dissected aorta. Nevertheless it always threatens the patient's life and may kill him (her) at any time. We believe

<table>
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<th>Table 2 Postoperative complications (including death).</th>
<th>Table 3 Cause of late death.</th>
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<tr>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>-----------------</td>
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</tr>
<tr>
<td>One or more complication</td>
<td>118</td>
</tr>
<tr>
<td>Intra operative</td>
<td></td>
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<tr>
<td>Neurologic disorders</td>
<td>38</td>
</tr>
<tr>
<td>Multiorgan failure</td>
<td>25</td>
</tr>
<tr>
<td>Low cardiac output</td>
<td>31</td>
</tr>
<tr>
<td>Renal failure (hemodialysis)</td>
<td>8</td>
</tr>
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</table>
that in some instances, this tamponade should be drained off in the intensive care unit, or in the operating theater, immediately before surgery. The withdrawing of a small quantity of blood through a small subxyphoidian incision may transform dramatically the circulatory situation and allow the surgical aortic repair to be initiated in good conditions.

Malperfusion is a much more insidious and dangerous condition. It may occur, pre, intra or postoperatively. It often threatens the patient's life, the diagnosis may be delayed and the treatment is often difficult.

Preoperatively the diagnosis of malperfusion may be obvious (neurologic disorder, limb ischemia). But it is often totally ignored, in particular when the digestive tract is concerned.

This raises the question of the proper exploration of the patients. There is a present trend to favor non invasive diagnostic techniques such as transesophageal echogram or CT scan. Nevertheless, it seems that aortography might still be useful as it is the fastest, the simplest and the most efficient way to document a severe visceral malperfusion. If present, this malperfusion should be treated as soon as possible. The treatment may consist in fenestration carried out through either radiologic interventional or surgical methods. But the first treatment is in our opinion, the aortic replacement. In many cases, indeed, the malperfusion disappears after resection of the main entry site and replacement of the ascending aorta. If this is not the case, fenestration must be undertaken immediately after the ascending aortic repair.

Intraoperative malperfusion is even more deleterious. It generally concerns the brain and remains often ignored throughout the whole duration of the surgical procedure. Some precautions may help to recognize such a complication: the bilateral radial artery pressure measurement; the permanent recording of the electro-encephalogram or near infra-red saturation or trans cranial doppler. In most cases, brain malperfusion during cardiopulmonary bypass is the result of the selective perfusion of the false channel through the femoral artery cannulation. When recognized, it can be treated by rapidly switching the cannula to the contralateral femoral artery with no certainty that it will be more efficacious. One can also cannulate the innominate and left carotid arteries in order to immediately perfuse the brain, as there is no time to reach general deep hypothermia. But we believe that the best way of avoiding such a complication is to no more cannulate the femoral artery but systematically use the right sub-clavian artery. This vessel is indeed, never dissected. Its cannulation is easy, safe and provides a physiological antegrade perfusion to the aorta, throughout the whole procedure. Therefore there is no necessity of reperfusing the patient through the aortic prosthesis when unclamping or resuming the cardiopulmonary bypass after completion of the aortic replacement.

Postoperative or unrecognized visceral malperfusion can be held responsible for a large amount of early deaths. In the present study, it is noticeable that 15 (8%) patients died from stroke and 13 (6.1%) patients died from multiorgan failure. In addition, 10 patients (5%) had non fatal multiorgan failure. It is highly probable that most of those cases were unrecognized or belatedly diagnosed malperfusion.

The analysis of the late results demonstrates that late deaths are mainly the result of reoperations (18%), rupture of a persisting patent false lumen (25%) or of an unknown cause. This latter group is in fact not so unknown. It consists mainly in sudden deaths probably related to aortic rupture which could not be assessed by autopsy. It is therefore sensible to state that the permanence of a chronic dissection is the major risk-factor of late death.

So, we believe that the initial emergency procedure has a secondary goal. That is, preventing the patient from the aneurysmal evolution of a persisting patent false lumen, the recurrence or worsening of an aortic regurgitation, the maintenance of a chronic malperfusion. In other words, to the question: has the initial operation any influence on the long-term results?, the answer is definitely: yes. To achieve this goal it seems of major importance that during the initial procedure not only the aortic segment at risk (the ascending aorta) should be taken into account but also, the whole aortic root (including the aortic valve), the site and extension of the proximal intimal tear
(particularly in the transverse arch), the consequent perfusion and dilatation of the false lumen.

The intimal tear either in the ascending aorta or in the transverse arch must be resected. The first attempts to only suture the intimal tear have resulted systematically in intra operative death by hemorrhage or rupture or in the development of an important aneurysm of the ascending aorta leading to early reoperation. The aorta must always be replaced with a Dacron® prosthesis. In 1989, Fabiani and coworkers published a report on a small cohort of patients in whom the GRF glue was employed to glue the intimal tear in the aortic arch without graft replacement 8). The immediate results were promising. However, the long-term results were never published and it is to be feared that further dilatation of the non-replaced aorta had occurred and that the rate of late reoperations would be important. We have personally reoperated on two such patients for secondary arch replacement. Similarly, Seguin et al. in 1994 reported a series of six patients in whom the fibrin sealant was used to directly glue the intimal tear of the dissection located on the transverse arch and obliterate the false lumen without using a dacron prosthesis.9) Again, the results in the mid-term (2.3 year-mean follow-up) were satisfactory. But long term results obtained with those techniques were not published. In particular the rate of reoperation is not known and, so, there is a great uncertainty concerning the long-term stability of the repair.

The use of intra-luminal prostheses seems to have the same poor long-term fate. Although we have personally no experience of those artifacts during emergency surgery, we have reoperated on two patients with such a prosthesis implanted two and four years previously. In both cases the aortic root upstream and the aorta downstream the prosthesis were extremely dilated with an impending rupture. Those observations confirm that the intimal tear is not the only element that should be taken into consideration when dealing with acute dissections involving the ascending aorta.

This leads to the important question of the transverse arch replacement during emergency repair.

As we consider indeed that the resection of the intimal tear is mandatory, it is necessary, at least in our opinion, to replace partly or totally the transverse arch if the entry site is located in or extends to this aortic segment or if this segment seems dangerously compromised by the dissecting process 10). This opinion is justified by the fact that in 46 patients who survived emergency arch replacement, only two patients (4.5%) required a late reoperation on this site whereas 23 (19.1%) of the 120 survivors with no arch replacement had to undergo a reoperation during which the arch had to be replaced in 16 cases (66%). This difference is statistically significant (×2, p=0.01). This strongly suggests that resecting the arch when the intimal tear is located on it would result in fewer late reoperations 11,12).

In the great majority of patients, a partial or anterior “semi-arch” replacement is sufficient, as the intimal tear is generally located in the concavity of the transverse arch. Therefore a beveled resection of this aortic portion extending from the origin of the innominate artery to the end of the concavity, in front of the origin of the left-subclavian artery, is carried out, allowing a direct anastomosis of the ascending aortic graft to the distal aorta.

The emergency replacement of the transverse arch does not increase the surgical risk. The hospital mortality rates in patients undergoing arch replacement and patients without arch replacement were respectively, 20.5% (31/151) and 24.5% (15/61) the difference being non significant.

Does this justify the systematic performance of an open distal aortic anastomosis, even in cases in which the intimal tear is totally located in the ascending aorta? In other words: should aortic cross-clamping be considered as very dangerous? The possibility of inducing lesions (secondary intimal tears or rupture) with the aortic clamp during cross-clamping of the dissected aorta, has led many surgeons to consider that cross-clamping the vessel should be avoided in any circumstances. They may be right as the open distal anastomosis allows a better exploration of the transverse arch and an easier and more extended aortic repair. It also probably reduces the risk of reperfusion of the false channel. Nevertheless, this procedure implies that the brain be
protected during the time, even limited, of arch exclusion. It therefore necessitates either to cool down the patient's temperature to achieve deep hypothermia or to cannulate the innominate and left carotid arteries to perfuse the brain. Doing so, the patient is submitted to the risks entailed by the techniques of arch exclusion associated with brain protection. It is therefore possible that some complications be traded off against others.

The proper management of the aortic root and aortic valve appears also as a major factor of satisfactory and stable long-term result. The aortic valve is often normal anatomically and physiologically before the occurrence of the dissecting process. The valvular regurgitation is therefore acute and, when important or massive, impairs dramatically the left ventricular function and, so, threatens the patient's life. The surgical treatment of this valvular dysfunction must then be undertaken urgently, together with the cure of the ascending aortic defect. During the late seventies and the early eighties, there has been a certain trend favouring valve replacement with separated replacement of the ascending aorta even in patients with a perfectly normal aortic valve. This policy has, however, disadvantages when compared to valve resuspension. The patient is, indeed, subjected to the uncertainties and risks of prosthetic valve. For those reasons, the trend has changed and several documented publications reporting on large experiences have emphasized the necessity of preserving the native valve whenever possible.

This is best performed by repairing the aortic root with the aid of the GRF glue and resuspending the valve. In some instances, although the valve is perfectly normal anatomically, the sinuses of Valsalva are either dilated or destroyed by the dissecting process. Yacoub in 1993 and David in 1992 have proposed to totally replace the aortic root while preserving the native valve. We have performed successfully this procedure in six cases. One patient, however, had to undergo aortic valve replacement 11 months after the initial operation because of a progressively increasing aortic regurgitation. In other words, this technique is still under evaluation and requires further experience before being considered as a routine procedure. It is, however, promising and might be of great benefit in patients with a complete disruption of the aortic root due to the dissecting process.

In presence of a chronic defect of the native valve, the only solution is to replace the valve. This can be performed separately with repair of the aortic root and preservation of the coronary ostia. However, in addition to the general risk entailed by the presence of a valvular prosthesis, this technique commits the patients to the risk of redissection or dilatation of the remaining sinuses of Valsalva and, so, to the risk of late reoperation.

The valve can also be replaced by means of a composite graft with reimplantation of the coronary ostia. This method has the advantage of eliminating the risk of further dilatation of the proximal aortic stump. It also appears to reduce the prevalence of post-operative hemorrhage and perivalvular leak. It is obviously the technique of choice in patients with annulo-aortic ectasia or Marfan's syndrome. Since its introduction by Bentall and De Bono in 1968, the composite graft technique has been applied with reasonably low risk. The technique consisting in totally detaching and mobilizing the coronary ostia (or so-called button technique) is probably more appropriate in patients with acute dissection. It is indeed easier to make sure that the anastomosis involves the whole thickness of the vascular wall in the suture line.

This policy concerning the aortic root seems to be appropriate. In the present experience indeed, 147 aortic valve were preserved (144 requiring no particular gesture or only resuspension and 3 Yacoub's procedures). Nineteen patients (14%) developed further aortic regurgitation of some importance which resulted in reoperation in only 8 cases (5.5%). Thirteen patients had an isolated aortic valve (6 prior to the dissecting process) and no one had to be reoperated on at this site. Forty-five patients had an annulo-aortic ectasia including 28 Marfan's patients. Thirty-eight had a composite graft replacement with 3 late reoperations (1 valve thrombosis, 2 peritubular leaks) and 3 patients had a Yacoub's procedure with one late reoperation for aortic regurgitation.

One can therefore state that through the better management of the above-mentioned elements and a more appropriate surgical repair of the proximal aorta, the rate of late reoperations and
distal ruptures might be reduced. It is probably the best way to break the rationale leading to late reoperations and late distal ruptures\(^{19}\). Those two features may represent indeed, up to 70\% of late deaths in the present experience, if we consider that unknown causes of death were in fact late ruptures.

Nevertheless, this improved prognosis through better surgical management might not apply to patients with Marfan's syndrome. The necessity of late reoperation or the occurrence of a late rupture in those patients are mainly linked to their basic condition and to the pathologic evolution of the aorta distal to the initial repair. It is unlikely that the evolution of the distal aorta would be greatly affected by a better management of the proximal portion of the vessel and the arch replacement at first emergency procedure, except perhaps the reduction of the false lumen perfusion by permanent use of antegrade flow. Whatever technique is used during the first emergency operation, Marfan patients are submitted to a high risk of late reoperation. This is confirmed by the fact that among the 22 Marfan patients surviving the initial procedure, 10 (40\%) underwent 17 late reoperation, (1.7 operations per patient) whereas only 15 (10.4\%) out of the 130 non-Marfan patients surviving the initial emergency operation had to undergo 17 reoperations (1.1 operation per patient). The difference is significant \((p<0.01)\). This difference is even greater if we consider that 8 out of the 9 sec and third reoperations were carried out in patients with Marfan's syndrome. Therefore the relative risk of late reoperation in Marfan patients is six fold higher than that of non-Marfan's patients (0.72 vs. 0.12).

Is it possible to reduce the prevalence of late reoperations and/or distal ruptures in those patients? They must be submitted to a regular survey on a one-year basis through non-invasive imaging techniques (MRI or CT-Scans). They must be maintained under beta-blocking therapy in order to reduce the aortic wall stress. But a very difficult question remains unsolved yet: when should we operate on those patients in presence of a dilated thoraco-abdominal aorta, especially when they are totally asymptomatic and live a normal life? The delicate balance between the risk of rupture and the risk of thoraco-abdominal aortic replacement still represents a tough and troublesome concern (Fig. 1).

Conclusion

Presently nobody would deny that acute dissections involving the ascending aorta require urgent operation and that, the main cause of death being cardiac tamponade, the first purpose of the surgical treatment is to prevent intrapericardial rupture of the dissected aorta. Numerous publications attest that this primary purpose has been achieved. However, the hospital and late mortality and morbidity rates have not dramatically changed in the last two decades. This is related to the improper management of some preoperative conditions (tamponade), the belated diagnosis of some complications (malperfusion) and in many instances, the inadequacy of the surgical techniques used.

Nonetheless, during the passed 25 years, the ideas have evolved from the simple rescue of the threatened patient to the more ambitious purpose of treating the aortic destruction as completely as sensible or realistic and of trying to prevent the occurrence or the worsening of late complications. We have presently reached the conclusion that this may be possibly achieved by adapting the surgical technique to the pathological pattern.

During the surgical procedure visceral and brain malperfusion must be avoided, if possible. The best way is probably to avoid retrograde perfusion of the false lumen through femoral artery cannulation and to routinely cannulate the right subclavian artery in order to permanently perfuse the aorta antegradely.

In all patients, if the intimal tear is located on the ascending aorta, this segment should be replaced. The replacement must be as complete as possible. In this regard the complete suppression of the dissected sinuses of Valsalva using the Yacoub's or David's techniques might represent a clear
advantage, as it prevents from the risk of further dilatation or false aneurysm at this site.

When the intimal tear is located on or extends to the transverse arch, this segment should be partially or totally replaced. Failure to resect the intimal tear and replace the transverse arch in those cases predisposes to late reoperation.

The aortic valve must be preserved whenever possible.

In patients with Marfan’s syndrome or dystrophic annulo-aortic ectasia, the ascending aorta and the aortic root must be totally replaced, either with a valved conduit or, in a few selected cases, through a remodelling procedure. Nevertheless, in this group of patients the initial procedure entails a high risk of late reoperations.

Patients surviving an emergency procedure must be submitted to routine survey on a one-year basis by non-invasive techniques and receive Beta-blocking therapy. During this survey, elective reoperation should be considered in presence of pressing new symptoms or an evolving dissecting aneurysm before the occurrence of an acute major complication.

But the treatment of acute dissection is also prophylactic. Too many patients, indeed, are not operated from a diagnosed aneurysm of the ascending aorta in due time or do not undergo any cardiac exploration such as a transthoracic echo although they have a clear family history of acute dissection or Marfan’s disease. Any aortic dystrophy associated with an ascending aortic dilatation must be operated on as soon as it reaches 45 to 50 mm in diameter or demonstrates any sign of
increase or evolution.

References


