Efficacy of Isolated Profundaplasty

Profundaplasty has been advocated as an outflow procedure for threatened failure of aortofemoral grafts as well as a primary procedure for severe claudication and limb ischemia. The authors reviewed their experience with 27 patients who underwent profundaplasty between 1978 and 1983; five patients (group 1) were treated for threatened or complete aortofemoral graft thrombosis while 22 patients (group 2) underwent profundaplasty as an isolated procedure to treat limb ischemia. Preoperative angiograms were assessed for the presence of five criteria associated with a favourable result from profundaplasty: stenosis of the orifice of the deep femoral artery greater than 50%; minimal disease of the distal artery; disease-free collaterals; reconstruction of a patent superficial femoral or popliteal artery; good popliteal outflow with at least one vessel patent to the foot. Profundaplasty was successful in 100% of group 1 patients but relieved symptoms or healed lesions in only 14% of those in group 2. In the latter group 64% required major amputation. The number of favourable angiographic criteria was similar in both groups. Isolated profundaplasty for limb salvage is not recommended. Angiographic criteria do not reliably identify the few patients who will benefit from profundaplasty alone. The principal role of the procedure is increasing outflow for an aortic graft.

Il a été recommandé d’effectuer une plastie de l’artère fémorale profonde pour rétablir la circulation quand il y a une menace d’obstruction d’un pontage aortofémoral, de même qu’en première intention dans la claudication grave et l’ischémie des membres inférieurs. Les auteurs passent en revue leur expérience chez 27 patients qui ont subi, entre 1978 et 1983, une plastie d’une artère fémorale profonde. Cinq patients (le groupe 1) ont été traités pour menace de thrombose ou thrombose totale d’un pontage aortofémoral; 22 patients (le groupe 2) ont eu une plastie d’une artère profonde comme intervention isolée pour traiter l’ischémie d’un membre. Les angiographies préopératoires ont été évaluées selon cinq critères reliés à un résultat favorable de l’opération de plastie: sténose de plus de 50% de l’orifice de l’artère fémorale profonde; atteinte minimale de l’artère distale; collatérales intactes; reconstruction d’une artère fémorale superficielle ou d’une artère poplitée perméable; bonne circulation poplitée avec au moins un vaisseau perméable vers le pied. La plastie de l’artère fémorale profonde a réussi dans 100% des cas du groupe 1, mais n’a pu soulager les symptômes ou corriger les lésions que dans 14% de ceux du groupe 2. Dans 64% des cas du dernier groupe on a dû avoir recours à une amputation majeure. Le nombre de critères angiographiques favorables était similaire pour les deux groupes. La plastie de l’artère fémorale profonde n’est pas recommandée comme traitement de première intention pour sauver un membre menacé par l’ischémie. Les critères angiographiques ne permettent pas de sélectionner de façon sûre les quelques patients susceptibles de bénéficier d’une plastie seule. Le rôle principal de cette intervention consiste à augmenter la circulation dans une greffe aortique.

Profundaplasty has been advocated to restore the patency of thrombosed aortofemoral grafts and increase the longevity of threatened graft limbs.1,2 The procedure has also been used as a primary operation in other patients with superficial femoral artery occlusions who are suffering severe claudication, rest pain or ischemic ulcers.3-6

Our purpose in this study was to assess whether profundaplasty done as an “isolated” procedure reliably relieves rest pain or leads to healing of ischemic ulcers. We also wished to evaluate the strength of angiographic criteria previously identified as predictors of the success of profundaplasty to determine if there is a subset of patients who can be expected to benefit from the procedure.

Patients and Methods

We performed 27 “isolated” profundaplasties between 1978 and 1983. Patients, divided into two groups by clinical presentation, included 22 women and 5 men with an average age of 67.8 ± 4.7 (SEM) years. In group 1 were five patients treated for thrombosis of aortofemoral grafts (two) or threatened graft thrombosis (three). Group 2 comprised 22 patients who underwent profundaplasty for limb salvage. Seven of 22 patients had severe rest pain, 3 had ischemic ulcers with rest pain and 12 patients had distal areas of gangrene. Profundaplasty was not performed for claudication alone, although it was a common symptom. There were no diabetics in group 1 compared with 12 (55%) in group 2. Age, other medical problems and clinical presentations were otherwise similar in both groups.

All patients underwent noninvasive measurements of lower extremity segmental pressure preoperatively and postoperatively. A good clinical result was defined as relief of rest pain or healing of ischemic ulcers. Preoperative angiograms were

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reviewed and the presence of the following indicators was assessed: (a) severe stenosis (more than 50%) of the deep femoral artery orifice (Fig. 1); (b) minimal occlusive disease of the distal artery; (c) disease-free collaterals of the deep femoral artery; (d) reconstitution of a patent superficial femoral or popliteal artery; (e) good popliteal outflow with at least one vessel patent to the foot. Each angiogram was graded in a blinded fashion, with a score of five indicating that all of the above criteria were present. Figure 2 shows the type of deep femoral artery lesion that appears amenable to profundaplasty. Note the tight stenosis at the orifice of the left deep femoral artery and the subsequent delay in flow through its bed, compared with the arterial tree on the right side.

The technique of profundaplasty was as follows: the deep femoral artery was dissected to at least its second branch. An arteriotomy beginning at the common femoral artery was extended at least 5 cm down the deep femoral artery. An endarterectomy was then performed using 2.5 × magnification loupes and followed by a patch angioplasty. Prosthetic patches were used in all group 1 patients. Operations in 16 of the 22 group 2 patients utilized patches of autologous tissue (saphenous vein in 12 or endarterectomy modified superficial femoral artery in 4). Statistical analysis utilized Student’s t-test for unpaired data; p < 0.05 was considered significant.

Results

There were no deaths in the immediate postoperative period. All group 1 patients experienced good clinical results in the follow-up period (mean 5.9 years), and the grafts remained patent. Group 2 patients had a limb salvage rate of only 36%; 14 (64%) underwent major amputations in the follow-up period (mean 4.3 years). The average time between surgery and amputation was 2.3 months. A further five (22%) patients had no relief of the ischemic symptoms. Thus, only three (14%) patients had good clinical results, defined as healing of ischemic ulcers or relief of rest pain.

Ankle-brachial pressure indices were measured preoperatively and postoperatively. In group 1, the mean index rose from 0.30 ± 0.18 to 0.44 ± 0.16 (p < 0.05). No change in index was noted (0.29 ± 0.22 to 0.30 ± 0.23 [NS]) in group 2 patients.

Angiographic criteria were analysed for all patients. The average preoperative angiographic score of group 1 patients was 3.8 compared with 3.3 in group 2 patients (NS). The three patients in group 2 with good results all had ischemic ulcers and patent popliteal arteries. Their ankle-brachial pressure indices changed from 0.23 preoperatively to 0.47 postoperatively. However, there were two other patients in group 2 with all five favourable angiographic criteria who had no relief after isolated profundaplasty.

Another point of interest is the high female to male ratio (4:1) of our population, as opposed to most other series in which males predominated. The reason for this is not clear as it does not conform to our overall experience in vascular practice.

Discussion

Profundaplasty is accepted as an important procedure to ensure patency of an inflow graft in the presence of advanced superficial femoral artery disease. It has been shown that both the patency of the proximal graft and the relief of symptoms are higher when profundaplasty is performed in conjunction with aortofemoral bypass. Goldstone and colleagues reported a 5-year aortofemoral bypass patency rate of 93% when deep femoral patch angioplasty was performed in conjunction with aortofemoral grafting. Our small series certainly confirms this belief, as all five patients in group 1 experienced relief of symptoms and had patent grafts during the follow-up period.

The controversy over the benefits of profundaplasty arises when the procedure is used without inflow grafts. When performed for claudication several groups have reported good results with profundaplasty alone. Cotton and Roberts noted a 92% improvement in walking distance in patients whose primary complaint was claudication, while Morris, Jones and Jones reported 50% success among their group of claudicants. The results of isolated profundaplasty for limb salvage are not as impressive. In 1981, Towne and associates reported a limb salvage rate of only 57% at 1 year for profundaplasty in patients with impending loss of limb. Morris-Jones and Jones reported a similar 33% success rate in patients with severe ischemia. In our hands, isolated profundaplasty allowed a 36% limb salvage rate but only 14% of patients obtained relief of symptoms.

In sharp contrast are the results of Leather and colleagues who reported limb salvage in 79% of patients who underwent profundaplasty for tissue necrosis and 90% of patients treated for rest pain. In reviewing this series, it is evident that the procedure varied considerably from ours in that 40 of the 62 patients underwent concomitant iliaca or common femoral endarterectomy in addition to profundaplasty.

Mitchell and colleagues suggested specific arteriographic criteria that would predict a successful outcome from profundaplasty. It is uncontested that the presence of these five criteria produce an optimal situation for the procedure, but the number of patients meeting these criteria is limited. In fact, the criteria would be equally favourable to the performance of femoropopliteal bypass. Finally, the predictive value of these findings is questionable. In our series, there was no statistical difference in the number of favourable angiographic criteria between groups 1 and 2.

A single criterion, patency of the popliteal artery, correlates with results of profundaplasty in a number of ser-
ies,\(^4\,5\,11\) In the review by Cotton and Roberts\(^6\) a successful outcome of profundaplasty was achieved in 81% of patients with patent popliteal arteries and trifurcation vessels. Poor opacification of the trifurcation and especially poor filling of the tibial arteries at the level of the middle calf were usually associated with failure. In our patients requiring limb salvage, only 6 of the 22 had patent popliteal arteries. Three patients who responded well were among this minority, reinforcing the belief that this criterion may be the most reliable predictor.

**Conclusions**

An isolated profundaplasty is a desirable procedure in patients with threatened limb loss and a stenotic femoral anastomosis or a recently occluded aortofemoral graft limb. In patients at risk of limb loss, associated with extensive untreatable aortoiliac disease, isolated profundaplasty is of little benefit. In patients with such advanced disease, angiographic criteria have limited true predictive value.

**References**