



Review article

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THE RETROPERITONEAL APPROACH TO THE ABDOMINAL AORTA

SUMMARY

Within the community of the vascular surgeons, it has always been a matter of debate which surgical approach is tolerated better by the patient undergoing a reconstruction of the abdominal aorta. Transperitoneal approach offers several advantages: 1. simple and very fast approach (very important in emergency cases), 2. allows evaluation of the whole intraabdominal cavity, 3. it is easy to expose common iliac arteries, iliac bifurcation and both external iliac arteries, 4. reconstruction of both renal arteries, as well as visceral arteries, can be performed from the infrarenal aorta, 5. inferior mesenteric artery and eventually polar renal arteries can be incorporated in infrarenal aortic graft. Anterolateral retroperitoneal approach, and various modifications (e.g. extended retroperitoneal) have been described as a well-accepted alternative to the transperitoneal approach. In most centers, the retroperitoneal approach is used actually in well-defined indication both depending on the patient and the anatomy of the aortic aneurysm. Disadvantages are also listed: 1. quite time consuming compared with transperitoneal approach which makes it less attractive in emergency situations, 2. redo-operations might present a problem, 3. reimplantation of the inferior mesenteric artery is made more difficult, 4. access to the right common iliac artery and iliac bifurcation, as well as right renal artery is cumbersome, 5. retroperitoneal approach is contraindicated in the presence of venous anomalies. The general conclusion might be that none of the different approaches has a uniform advantage or disadvantage and that surgeons and their patients will be served best by both approaches, the choice of which is primarily dependent on the anatomical and technical requirements in each individual.

Key words: retroperitoneal approach, transperitoneal approach, abdominal aorta surgery

INTRODUCTION

Within the community of the vascular surgeons, it has always been a matter of debate which surgical approach is tolerated better by the patient undergoing a reconstruction of the abdominal aorta. When the first reconstructions were performed in

1951 an extraperitoneal approach was preferred. Oudot (1) performed the first aorto-bi-iliac graft for aorto-iliac occlusive disease. Dubost (2) was the first to replace an aneurysm of the abdominal aorta. Both of them used a retroperitoneal approach. However, in the following years, most surgeons turned to the midline transperitoneal and infracolic ap-

proach, probably because of the limited exposure offered by the retroperitoneal approach as it was mentioned by Oudot, but also because most general surgeons felt more comfortable with transperitoneal exposure of the abdominal contents. Indeed, a transperitoneal approach offers several advantages:

1. It is a simple and very fast approach, which might be very important in emergency cases, such as ruptured aortic aneurysms.

2. It allows surgical evaluation of the whole intraabdominal cavity. Concomitant colon carcinoma has been reported in 2 to 3% of the patients with infrarenal abdominal aortic aneurysm.

3. Transabdominal infracolic approach offers an excellent exposition of the infrarenal aorta. It is not too difficult to expose the common iliac arteries, the iliac bifurcation and both external iliac arteries (figure 1).



Figure 1. "Quadribifurcation" graft designed for revascularization of both external and internal iliac arteries during abdominal aortic aneurysmectomy.

4. Reconstruction of both renal and visceral arteries can be performed starting from the infrarenal aorta.

5. It allows dealing with the inferior mesenteric artery and eventually polar renal arteries, which can be incorporated in an infrarenal aortic graft.

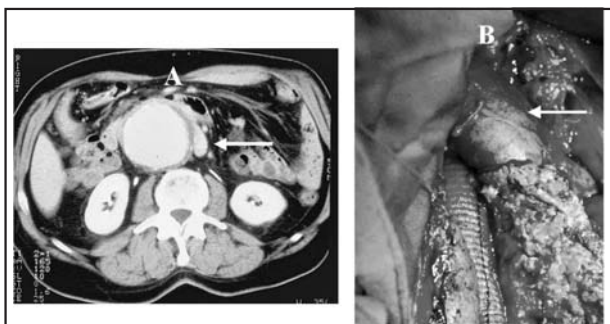


Figure 2. Persistent left caval vein in the presence of an infrarenal abdominal aortic aneurysm: (A) CT scan - left caval vein indicated by arrow; (B) intra-operative view (operation by midline laparotomy). The left caval vein crosses the Dacron graft just inferior to the level of the renal arteries (arrow)

6. Finally, in case of venous anomalies, transperitoneal approach is certainly preferable. This goes on for the left caval vein, for double caval vein and also for the retro aortic left renal vein (figure 2.)

In the meantime, the retroperitoneal approach was used less frequently, but was not forgotten. In 1963, Rob was the first to give a detailed description of the antero-lateral retroperitoneal approach and quoted advantages such as easier postoperative course but also disadvantages such as limited exposure. In the years to follow, several other surgeons have published good clinical results with various, modified retroperitoneal approaches. In 1980, Williams et al. (4) described the extended retroperitoneal approach, which allows a better exposure not only of the infrarenal but also the pararenal and even suprarenal aorta. This publication led to a revival of the interest of the vascular surgeons and, nowadays, the retroperitoneal approach is used in many centers as a well-accepted alternative to the transperitoneal approach. For the extended retroperitoneal approach, the patient needs to be positioned on his right side with the shoulders perpendicular to the operating table and the pelvis as horizontal as possible (corkscrew position). The table is broken at the level of the umbilicus. The incision starts at the lateral edge of the left rectus abdominis muscle and extends to the tip of the eleventh rib. Extension is possible by partial resection of the eleventh rib or incision of the rectus muscle. After entering the retroperitoneal space, the surgeon is looking for a plane in front of the left kidney, which allows exposing the complete infrarenal aorta and the common iliac arteries. Also, the approach allows exposing the pararenal and suprarenal aorta by retracting the left kidney to the right together with the peritoneal sack. Exposure is then provided from behind the kidney on the whole length of the abdominal aorta.

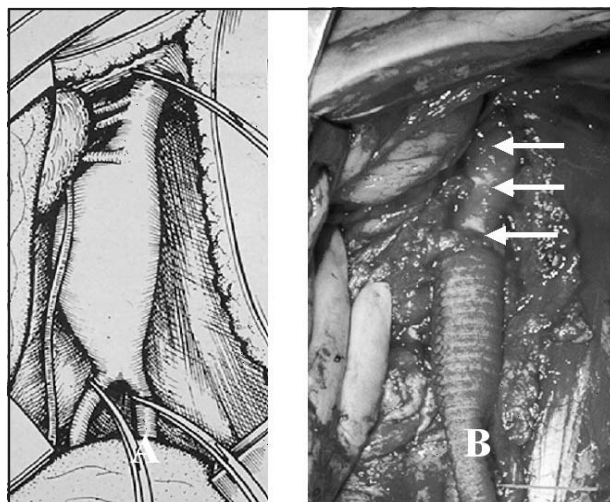


Figure 3. Exposure of the suprarenal aorta by retroperitoneal approach: (A) schematic drawing; (B) intra-operative view - arrows indicate renal artery, superior mesenteric artery and celiac trunk.

In most centers, the retroperitoneal approach is used actually in well-defined indications both depending on the patient and the anatomy of the aortic aneurysms.

Patient related indications include:

1. Hostile abdomen – multiple previous laparotomy.
2. Obesity.
3. Peritoneal dialysis.
4. Patients at high-risk for operation (not generally accepted).
5. Patients with a definite colostomy.

Aneurysm related indications include:

1. Juxtarenal or pararenal aortic aneurysm (figure 3 and figure 4).

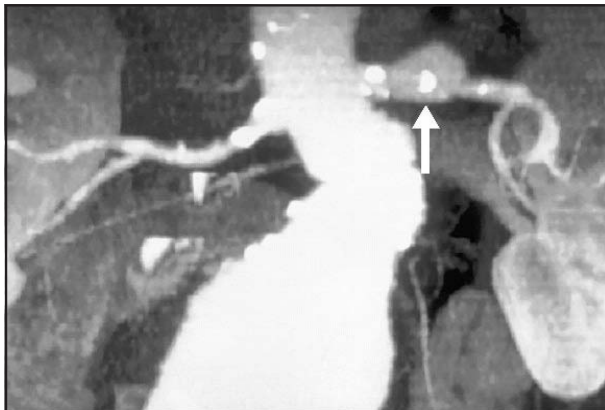


Figure 4. Infrarenal aortic aneurysm in combination with aneurysm of left renal artery (arrow). Ideal indication for retroperitoneal approach

2. Suprarenal extension of aortic thrombus
3. Inflammatory aneurysm where the fibrosis is usually less developed at the side than at the front of the aorta.
4. The use of the exclusion technique as described by Darling et al. (5) (figure 5).

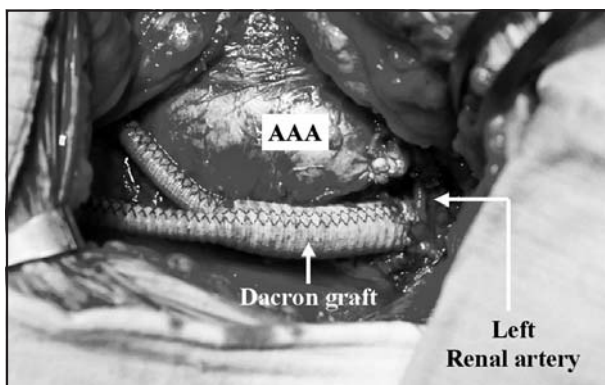


Figure 5. Infrarenal aortic aneurysm handled by the exclusion technique (retroperitoneal approach)

5. The presence of a horse-shoe kidney.
6. Redo aortic surgery after previous infra-renal aortic reconstruction.

Apart from this, it should be realized that the retroperitoneal approach has also several disadvantages:

1. When compared with transperitoneal approach it is quite time consuming, which makes it less attractive in emergency situations.
2. Exploration of the abdominal cavity is difficult if not impossible.
3. Redo-operations might present a problem.
4. Reimplantation of the inferior mesenteric artery is made more difficult.
5. Access to the right common iliac artery and its bifurcation is cumbersome. The same goes on the right renal artery.

6. Retroperitoneal approach might be contra-indicated in the presence of venous anomalies such as doubled or left caval vein.

Taking into account these advantages and disadvantages, the discussion at this moment is not whether the retroperitoneal approach is a valuable instrument to the vascular surgeon, but rather if the retroperitoneal approach should be preferred as the technique of choice in "every day" aortic surgery. In order to deal with this problem, we performed a prospective randomized study on the optimal surgical approach for elective reconstruction of the infra- and juxtarenal abdominal aorta. Two hundred patients with aortoiliac occlusive disease or infrarenal abdominal aortic aneurysm, who were candidates for reconstruction, were randomized between midline laparotomy (N=62), transverse laparotomy (N=73) or a retroperitoneal approach (N=65).

Reconstructions were standardized and the same surgeons performed the operations throughout the period of the study. All of the patients were followed up for at least one year.

The results of this study were:

1. Postoperative mortality was not significantly different between the three groups.
2. There were no significant differences with regard to postoperative cardiac or pulmonary complications.
3. Evaluation of the postoperative gastrointestinal function was significantly in favor of the retroperitoneal approach.
4. After one year, there were no significant differences in survival or graft patency between the different groups.

5. Patients after retroperitoneal approach had more incisional pain, but differences with the two other groups were not significant.

6. Incisional hernia was seen most frequently after midline laparotomy, but bulging of the abdominal muscles tended to be a problem after the retroperitoneal approach (figure 6).



Figure 6. Abdominal bulging (arrow) after retroperitoneal approach for aortic aneurysm.

7. The surgeons favored uniformly midline laparotomy.

Review of the literature revealed three other studies (6–8) where midline laparotomy was studied against retroperitoneal approach in a prospective randomized design. None of them showed any disadvantage of the retroperitoneal approach with regard to per- or postoperative evolution. Two studies documented a clear advantage for the retroperitoneal approach with regard to immediate gastrointestinal function, hospital stay and hospital costs. In the two other studies, there was a clinical impression of earlier return of gastrointestinal function in the retroperitoneal group. Finally, two of these studies documented an increased incidence of wound problems and incisional pain, also in the retroperitoneal group.

Therefore, general conclusion might be that none of the different approaches has a uniform advantage or disadvantage and that surgeons and their patients will be served best by both approaches, the choice of which is primarily dependent on the anatomical and technical requirements in each individual case.

REFERENCES

1. Oudot J. La greffe vasculaire dans les thromboses du carrefour aortique. *Press Med* 1951; 59: 234-236.
2. Dubost C, Allary M, Oeconomos N. Resection of an aneurysm of the abdominal aorta. Reestablishment of the continuity by a preserved human arterial graft, with result after five months. *Arch Surg* 1952; 64:405-408.
3. Rob C. Extraperitoneal approach to the abdominal aorta. *Surgery* 1963; 53:87-89.
4. Williams GM, Ricotta J, Zinner M, et al. The extended retroperitoneal approach for treatment of extensive atherosclerosis of the aorta and renal vessels. *Surgery* 1980; 88:846-855.
5. Darling RC, Shah DM, McClellan, et al. Decreased morbidity associated with retroperitoneal exclusion treatment for abdominal aortic aneurysm. *Cardiovasc Surg* 1992; 33:65-69.
6. Cambria RP, Brewster DC, Abbott WM, et al. Transperitoneal versus retroperitoneal approach for aortic reconstruction: a randomized prospective study. *J Vase Surg* 1990; 11:314-324.
7. Sicard GA, Reilly JM, Rubin BG, et al. Transabdominal versus retroperitoneal incision for abdominal aortic surgery: report of a prospective randomized trial. *J Vase Surg* 1995; 21:174-181.
8. Sieunarine K, Lawrence-Brown MM, Goodman MA. Comparison of transperitoneal and retroperitoneal approaches for infrarenal aortic surgery; early and late results. *Cardiovasc Surg* 1997; 5:71-76.

RETROPERITONEALNI PRISTUP ABDOMINALNOJ AORTI

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SAŽETAK

Među vaskularnim hirurzima uvek je postojalo otvoreno pitanje koju hiruršku intervenciju abdominalne aorte bolesnik najlakše podnosi: transperitonealnu ili retroperitonealnu. Prednosti transperitonealnog pristupa su: 1. jednostavan i brz, što je od značaja u urgentnim stanjima, 2. dozvoljava eksploraciju organa trbušne duplje, 3. jednostavan pristup zajedničkim ilijakalnim arterijama, ilijakalnoj bifurkaciji, kao i spoljašnjim ilijakalnim arterijama, 4.

moćuća je direktna arterijska rekonstrukcija renalnih i visceralnih arterija, 5. moćuća je implantacija u telo aortnog grafta polarnih renalnih arterija, kao i donje mezenterične arterije u slučajevima da je to neophodno. Anterolateralni retroperitonealni pristup, kao i njegove modifikacije (prošireni retroperitonealni pristup, na primer) su prihvaćene alternative transperitonealanom pristupu. U mnogim vaskularnim centrima primena transperitonealnog pristupa je indikovana kod bolesnika kod kojih to dozvoljava lokalno stanje bolesnika, kao i same anatomske karakteristike abdominalne aneurizme. Takođe, retroperitonealni pristup sa sobom nosi i sledeće nedostatke: 1. zahteva duće vreme u odnosu na transperitonealni pristup i izuzetno retko se primenjuje u urgentnim stanjima, 2. otećazan je pristup abdominalnoj aorti u slučaju reoperacija, 3. otećazana je reimplantacija donje mezenterične arterije, 4. pristup desnoj zajedničkoj ilijakalnoj arteriji, ilijakalnoj bifurkaciji i desnoj renalnoj arteriji je tećazak i zahtevan, 5. retroperitonealni pristup je kontraindikovan kada postoje venske anomalije (retroaortna donja šuplja vena, dvostruka donja šuplja vena). Namećeće se zaključak: ne postoje jedinstvene prednosti i mane pojedinih pristupa abdominalnoj aorti. Primenu transperitonealnog ili modifikacija retroperitonealnog pristupa bi trebalo zasebno razmotriti kod svakog pojedinaćnog bolesnika, imajući u vidu anatomske i tehnićke karakteristike bolesnika i planiranog operativnog zahvata.

Ključne reći: retroperitonealni pristup, transperitonealni pristup, hirurgija abdominalne aorte