

more than feasibility of the procedure has been demonstrated. However, the early conclusion that robotic technology holds a significant potential in pushing the envelope of minimally invasive vascular surgery, seems justified.

## Conclusions and future prospects

Whereas for occlusive aortoiliac disease surgical bypass grafting has been largely replaced by endovascular techniques, aneurysmal disease still poses considerable challenges to the endovascular therapist. Especially long term results of endovascular AAA repair have been disappointing, leaving opportunities for conventional surgical techniques. Moreover, if with the development of videoscopic and robotic technology invasiveness and complication rates of surgical aortic replacement can be reduced, a come back of surgical replacement, especially in younger patients, may be anticipated. Also, in conjunction with endovascular graft placement, robot-assisted videoscopic suturing techniques may prove invaluable in graft fixation and aortic branch management both at thoracic and abdominal levels<sup>9</sup>. Celiac, mesenteric and renal revascularization procedures, if unsuitable for endovascular repair, will be greatly facilitated by robotic techniques. In summary, with the expected further technical advancement and availability of robotically aided videoscopic techniques it seems important for vascular surgeons to keep their basic laparoscopic skills updated in anticipation of marked reduction or even disappearance of conventional "open" vascular surgery within the upcoming years.

## References

1. Dion YM, Gracia C. Totally laparoscopic aortic abdominal aortic aneurysm repair. *J Vasc Surg* 2001; 33(1): 181-5.
2. Kolvenbach R, Ceshire N, Pinter L, Da Silva L, Deling O, Kasper AS. Laparoscopy-assisted aneurysm resection as a minimal invasive alternative in patients unsuitable for endovascular surgery. *J Vasc Surg* 2001; 34(2): 216-221.
3. Ahn SS, Hiyama DT, Rudkin GH, Fuchs GJ, Ro KM, Concepcion B. Laparoscopic aortobifemoral bypass. *J Vasc Surg* 1997; 26(1): 128-132.
4. Alimi YS, Hartung O, Orsoni P, Juhan C. Abdominal aortic laparoscopic surgery: retroperitoneal or transperitoneal approach? *Eur J Vasc Endovasc Surg* 2000; 19(1): 21-26.
5. Coggia M, Bourriez A, Javerliat I, Goeau-Brissonniere O. Totally laparoscopic aortobifemoral bypass: a new and simplified approach. *Eur J Vasc Endovasc Surg* 2002; 24(3): 274-275.
6. Rockall TA, Darzi AW. Tele-manipulators robots in surgery. *BJS* 2003; 90: 641-643.
7. Wisselink W, Cuesta MA, Gracia C, Rauwerda JA. Robot-assisted laparoscopic aortobifemoral bypass for aortoiliac occlusive disease: a report of two cases. *J Vasc Surg* 2002; 36(5): 1079-1082.
8. Ruurda JP, Broeders IAMJ, Simmermacher RPM, Borel Rinkes IHM, van Vroonhoven ThJMV. Feasibility of robot-assisted laparoscopic surgery: an evaluation of 35 robot-assisted laparoscopic cholecystectomies. *Surg Laparosc Endosc* 2002; 12(1): 41-45.
9. Ruurda JP, Wisselink W, Cuesta MA, Verhagen HJ en Broeders IAMJ. Robot assisted versus standard videoscopic aortic replacement in an experimental model. *Eur J Vasc Endov. Surg.* in press.
10. Wisselink W, Cuesta MA, Berends FJ, Berg van den FG, Rauwerda JA. Retroperitoneal endoscopic ligation of lumbar and inferior mesenteric arteries as a treatment of persistent endoleak following endoluminal aortic aneurysm repair. *J Vasc Surg* 2000; 31: 1240-4.