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Available Online Date/Çevrimiçi Yayın Tarihi: 22.04.2013

doi:10.5152/akd.2013.114

Percutaneous right internal jugular venous cannulation in minimally invasive cardiac surgery

Minimal invaziv kalp cerrahisinde perkütan sağ internal juguler venöz kanülasyon

Introduction

The applications of cardiac surgery (CS) have progressed most notably with the development of minimally invasive techniques. The usage of smaller diameter venous cannulas and vacuum-assisted venous return (VAVR), greatly provided the opportunity to perform minimally invasive procedures (MIP)(1). This has increasingly led surgeons perform cardiac procedures through smaller than traditional incisions which was suggested by Doty et al. in 1998 (2, 3). Nonetheless, the reduced incision size has been matched by a corresponding increase in technical difficulty and operative time due to the limited cardiac exposure (2). With this regard, taking as much the cannulas off the operation field was a concern in order to ease the manipulation and exposure (4). Moreover, the success and relative ease of peripheral cannulation along with the use of VAVR has permitted the application of cardiopulmonary bypass (CPB) feasible for MIPs (1, 5-7).

The aim of this article is to inform in regard to the advantages and the ease of the application of percutaneous right internal jugular venous cannulation (PRIJVC) in MIPs.

Table 1. The demographic and operative characteristics of the cases'

Characteristics	Case 1	Case 2
Age, years / Gender	17/Female	35/Male
Body surface area, m^2	1.6	2.1
Venous cannulation sites	IVC and RIJV	RFV and RIJV
Arterial cannulation site	Ascending aorta	Right CFA
Volume of prime solution, cc	1200	1450
Flow rate, L/min	3.75	5.16
Duration of CPB	40	45
Duration of ACC, min	14	12
Duration of operation, min	175	140
Duration of ICU stay, hours	20	18
Duration of hospitalization, days	3	4

ACC - aortic cross clamp, CFA - common femoral artery, CPB - cardiopulmonary bypass, ICU - intensive care unit, IVC - inferior vena cava, RFV - right femoral vein, RIJV - right internal jugular vein

Figure 1. Percutaneous right internal jugular venous cannulation 1 (a-c) and 2 (d-f)

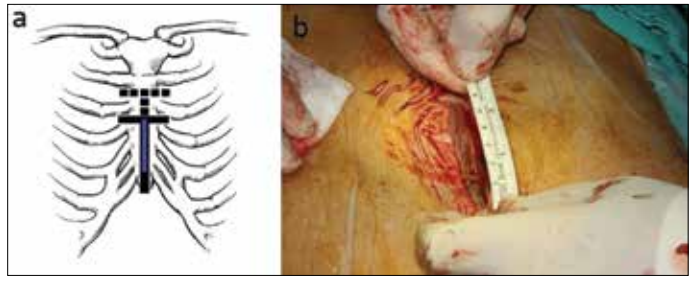

Figure 2. (a) Schematization of the distal partial T sternotomy depicted in black solid line, with extension option of it to second intercostal space depicted in black dotted line. Blue line indicates the skin incision. The 6 cm skin incision (b)

Case Report

In 2011, we performed two minimally invasive secundum atrial septal defect (ASD) closure with PRIJVC. The ASDs were inappropriate for percutaneous device closure due to inadequate antero-superior septal rim. The demographic and operative characteristics of the cases' are summarized in Table 1.

The jugular cannulation in both cases was performed as the first step before sternotomy percutaneously under 1 mg/kg intravenous heparinization with a 20 Fr femoral artery cannula (Edwards Lifesciences, Fem-Flex II, Irvine, CA, USA). The cannulation was performed with Seldinger technique through anterior approach in Trendelenburg's position (Fig. 1). The cannula was secured on the understanding that the final positioning of the tip of the cannula will be adjusted just before the superior caval tourniquet with inspection and palpation during cardiac exposure. The remaining 2 mg/kg intravenous heparin was administered after sternotomy in case 1 and before the femoral arterial cannulation in case 2.

Both operations were performed through 6 cm skin incision with distal partial 'T' sternotomy (Fig. 2) along with the application of -20 to -40 mmHg VAVR (Baxter, Las Vegas, Nevada, USA). In both cases, the ASDs were closed with ePTFE patch and the termination of CPB was

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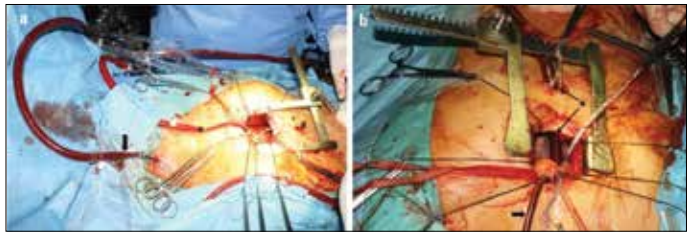

Figure 3. The setting of CPB in case 1 (a); the arrow indicating jugular cannula, the star indicating the ascending aortic cannula and the number indicating the skin incision of the pericardial drain used as a tract for inferior vena cava cannulation (b) in order to take the cannula off the operation field. Star with thin arrows indicates the inferior vena cava cannula and the thick arrow indicates the ascending aortic cannula
CPB - cardipulmonary bypass

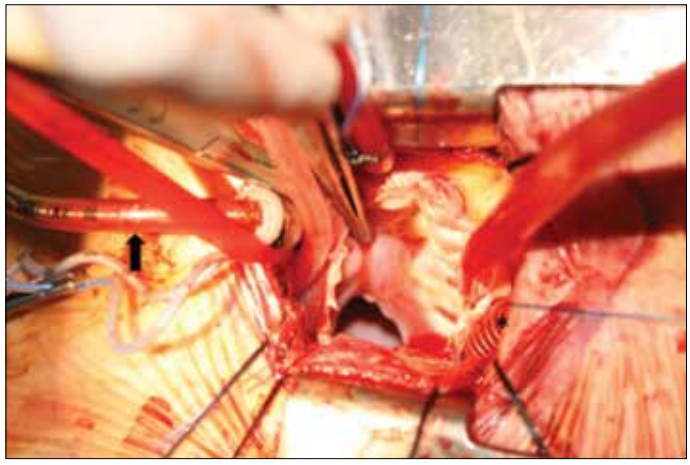

Figure 4. The atrial septal defect explored in case 1. Arrow indicates ascending aortic cannula and the star indicates inferior vena cava cannula. Note that the field is lack of superior and inferior cannula letting exploration and the manipulation more easier

performed in standard fashion. None of the cases experienced neurologic or access site related complication.

In Fig. 3, the setting of CPB along with the inferior vena cava cannula initiated through the skin incision of the pericardial drain is presented. The ASD can easily be explored in Fig. 4. The setting of CPB together with femoral vein cannulation in case 2 is demonstrated in Fig. 5.

During decannulation, after neutralization with protamine, the jugular venous cannula was pulled away and hemostasis was achieved by manual compression for 10-15 minutes (Fig. 6a). After surgical hemostasis was achieved, the chest was closed in standard fashion (Fig. 6b, c).

Discussion

The advancements have been explosive sweeping aside the old standards in CS. The RIJV represents one of the most commonly used central venous access site for CS patients (8-10). Minimally invasive cardiac surgery (MICS) patients are increasingly becoming the greater part of the CS population. MICS is an important frontier facing the profession with a huge oasis of opportunity for both the cardiac surgeons and the patients. From another point of view, while this approach provides adequate exposure, only one operator could see well thus, it makes difficulties for assistants to help and moreover, it is hard to train residents how to perform these procedures via this incision (2). In our opinion, taking off the most cannulas out of operation field helps trainees to rule over the operation more efficiently. Use of a head video

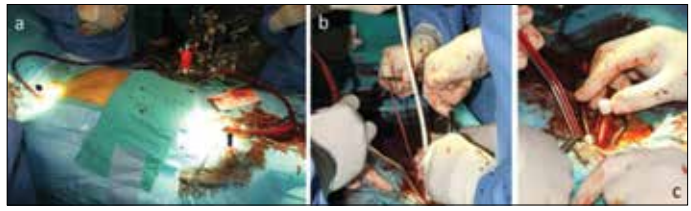

Figure 5. The setting of CPB in case 2 (a) with the arrow indicating the femoral artery cannula and the star indicating the jugular cannula. The application of the femoral venous cannula (b) and the final positioning of the femoral artery and venous cannulas are depicted (c)
CPB - cardipulmonary bypass

Figure 6. After neutralization with protamine, the jugular venous cannula was pulled away and hemostasis was achieved by manual compression for 10-15 minutes (a). The completion of surgery in case 1 (b) and case 2 (c)
CPB - cardipulmonary bypass

camera is thought to be an attractive way to take attention of the residents for the procedure.

It is apparent that the method of PRIJVC provides a less cluttered operative field, particularly when the arterial cannulation is made other than the site of ascending aorta.

Conclusion

PRIJVC in MIPs can readily be accomplished in most cases with relative ease and safety in experienced hands. As cardiovascular surgeons in this era of minimally invasiveness, we are responsible to embrace the future of the profession and the management of these patients that we will be expected to be facile with the commencement of CPB through RIJV.

Conflict of interest and funding

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article. The authors received no financial support for the research and/or authorship of this article.

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Available Online Date/Çevrimiçi Yayın Tarihi: 22.04.2013

doi:10.5152/akd.2013.115

Suspected endocarditis after CoreValve® implantation: a word of caution

CoreValve® implantasyonu sonrası ortaya çıkan şüpheli endokarditis: Değinilmesi gereken bir uyarı

Introduction

Transcatheter aortic valve implantation (TAVI) has been recently popularized as a safe and valuable alternative in patients deemed at too high risk for conventional surgery. Management of suspected endocarditis after TAVI should be pondered and surgical intervention should be advocated only when the diagnosis is certain and conventional medical treatment has failed. We herein report a case of suspected prosthetic valve endocarditis resolved after adequate medical treatment.

Case Report

An 80-year-old male patient was referred to our Institution for fever of unknown origin, disorientation, and recent onset of dyspnea (Euroscore: 10). Four months previously he had undergone a transfemoral TAVI with a CoreValve® prosthesis (Medtronic Inc., Minneapolis, Minnesota, USA). After the procedure he was discharged on oral double anti-platelet therapy (aspirin and clopidogrel) as prevention for valve thrombosis. He was then submitted 2 months later, in another hospital, to a trans-urethral prostatectomy and cystostomy for a benign prostate hypertrophy. In order to perform the procedure, the anti-aggregation was interrupted, no prophylactic heparin was given, and single anti-aggregation (aspirin) was restarted few days later. Infective endocarditis prophylaxis was administered before the procedure.

At admission the patient presented in good hemodynamic compensation. Standard blood and urine analysis documented elevated phlogosis indexes (C-reactive protein 13.0 mg/dL) and leucocyturia (WBC 500/µl). Blood cultures resulted positive for Enterococcus faecalis and a targeted antibiotic therapy with vancomycin was started. In spite of maximal medical treatment, the patient remained febrile. At this stage, a transesophageal echocardiography (TEE) was performed documenting a mobile 18x7mm mass on the CoreValve® prosthesis (Fig. 1. Video 1. See corresponding video/movie images at www.anakarder.com). Heart and prosthesis function were within normal limits. After collegial discussion with the cardiac surgeons, and in consideration of the high surgical risk profile of the patient (Euro-SCORE: 45%), it was decided to manage the condition medically. To exclude the possibility of a prosthesis thrombosis, a therapeutic regimen of sub-cutaneous low molecular weight heparin was coupled with the oral aspirin. The patient improved slowly and a control TEE performed 10 days after initiation of the targeted antibiotic therapy showed complete resolution of the mass and confirmed normal function of the prosthesis (Fig. 2. Video 2. See corresponding video/movie images at www.anakarder.com). After 6 weeks of antibiotic therapy, a second TEE documented a normally functioning prosthesis without any vegetation and without signs of structural degeneration or lesion. The patient was eventually discharged home in good hemodynamic and general condition.

Discussion

Endocarditis after TAVI has been previously reported and successfully treated with conventional surgery (1). It should be emphasized that in high-risk patients previously rejected to surgery, emergent intervention for eradication of prosthetic endocarditis carries a heavy morbidity and mortality burden. For this reason, certainty of the diagnosis and adequate medical treatment should be advocated before referring the patient for a more invasive intervention. Furthermore, the endocarditis prophylaxis should be administered before surgery and emergent intervention in patient after TAVI.

Moreover, the adequate anti-aggregation regimen for patients after TAVI remains controversial. Discontinuation of anti-aggregation and

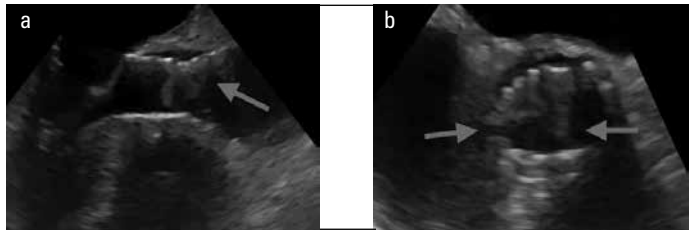

Figure 1. Transesophageal echocardiography showing a mass (18x7mm) on the CoreValve ® prosthesis (white arrows). a) long-axis view; b) short-axis view

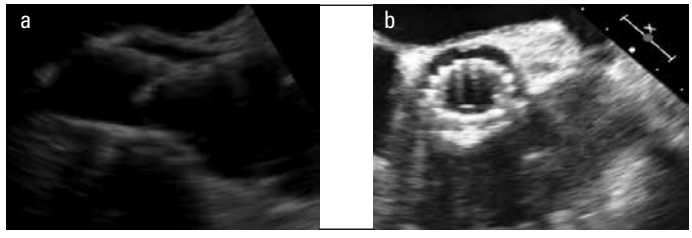

Figure 2. Transesophageal echocardiography 10 days after initiation of antibiotic treatment and heparinization showing disappearance of the mass without any residual structural lesion of the CoreValve ® prosthesis (white arrows). a) long-axis view; b) short-axis view