Araştırma Makalesi

Endovascular Aneurysm Repair for Infra-renal and Thoracic Abdominal Aort Aneurysms Under Local Anesthesia with Sedation

İnfrarenal ve Torasik Abdominal Aort Anevrizmalarına Lokal Anestezi ile Sedasyon Altında Endovasküler Anevrizma Onarımı

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Abstract

Background: This study aims to report our experience of endovascular aneurysm repair with LA and sedation in patients with infra-renal aortic aneurysm and thoracic aorta aneurysm.

Materials and Methods: Between July 2011 and July 2013, 8 patients underwent endovascular aneurysm repair with local anesthesia and controlled sedation in our department. Local anesthesia was achieved by infiltrating 2% Prilocain and for the sedation was provided by intravenous midazolam 0.05 - 0.2 mg/kg IV, fentanyl 50-150 microgram IV bolus, and propofol 25-75 microgram /kg bolus.

Results: Endovascular aneurysm repair was used in six patients infra-renal aortic aneurysm and two patients thoracic aorta aneurysm. No mortality or major post operative morbidity was recorded and the mean hospital stay post procedure was 3.2 days (range 2-5 days). One year follow-up all patient no mortality or recurrence was observed.

Conclusion: Endovascular aneurysm repair are safe procedure in critical patient and easily done under local anesthesia and sedation. LA with sedation in this procedure might be an alternative in anesthetic management.

Key Words: Aortic Aneurysm, Endovascular Procedures, Local anesthesia, Sedation.

Öz

Amaç: Bu çalışmanın amacı infrarenal aort anevrizma ve torasik aort anevrizmalı hastalarda lokal anestezi ile sedasyon eşliğinde endovasküler anevrizma tamiri deneyiminin raporlanmasıdır.

Materyal ve Metod: Temmuz 2011 ve temmuz 2013 arsında 8 hasta departmanımızda lokal anestezi ve kontrollü sedasyon eşliğinde endovasküler anevrizma tamiri uygulandı. Lokal anestezi 2% Prilokain infiltrasyonu ile sağlandı ve sedasyon ise intravenöz midazolam 0.05 - 0.2 mg/kg IV, fentanyl 50-150 microgram IV bolus, and propofol 25-75 microgram /kg bolus ile temin edildi.

Bulgular: Endovasküler anevrizma tamiri 6 infrarenal aort anevrizması ve 2 torasik aort anevrizması hastalarına uygulandı. Mortalite veya major postoperatif morbidite kaydedilmedi ve işlem sonrası ortlama hastanede kalış süresi 3,2 gün (2-5 gün) idi. Bütün hastaların bir yıllık takiplerinde mortalite veya rekürrens izlenmedi.

Sonuç: Endovasküler anevrizma tamiri kritik hastalarda güvenli prosedürdür ve kolaylıkla lokal anestezi ve sedasyon altında uygulanabilir. Bu prosedürde lokal anestezi ile sedasyon anestezi yönetiminde bir alternatif olabilir.

Anahtar Kelimeler: Aort anevrizması, Endovasküler Prosedürler, Lokal anestezi, Sedasyon

INTRODUCTON

Abdominal aortic aneurysm (AAA) is a dilation of the aorta that is greater than 3 cm in diameter and if AAA ruptures, this is often fatal. Therefore, AAAs are larger than 5.5 cm are usually treated surgically in recent century. However, over the past 20 years, a newer technique has been used without the need for open surgery (1). Parodi and colleagues was first introduced Endovascular aneurysm repair (EVAR) in 1990. This minimally invasive procedure is alternative to the conventional open surgical repair with decreased mortality and morbidity (2).

Thoracic aortic aneurysm (TAA) is an uncommon disease with an incidence of 10.4 per 100,000 populations. Progressive but incalculable enlargement of the dilated aorta is the natural course of the disease and can lead to rupture. Open chest surgical repair has been a traditional treatment for TAAs. Thoracic endovascular aneurysm repair (TEVAR) is also an alternative treatment of conventional surgical treatment with decreased morbidity and mortality (3). TEVAR might also be an option for patients with type B aortic dissection like in TAAs (4-5)

EVAR and TEVAR is usually placing through a trans-femoral route by a groin incision or a percutaneous technique and therefore surgeons was not need cross clamping of the aorta and eliminate complications associated with cross clamping. Different anesthetic techniques have been used for EVAR including general anesthesia, regional (epidural, spinal or combined epidural-spinal anesthesia) and local anesthesia (LA) (6). The aim of this report is to report our experience of EVAR and TEVAR with LA and sedation in patients with infra-renal aortic aneurysm and thoracic aorta aneurysm

MATERIALS AND METHODS

This is a retrospective study of patients with infra-renal abdominal aortic aneurysm (AAA) and thoracic aorta aneurysm who underwent an EVAR and TEVAR procedure under LA with sedation during between July 2011 and July 2013. The Institutional Ethical Committee approved this study, which was performed in accordance with the ethical principles for human investigations as outlined by the Second Declaration of Helsinki. Demographic data, co-morbidities, length of postoperative stay, ICU admission, 30-day post operative mortality and morbidity were obtained from patient's records. Six patients underwent EVAR and two patients underwent TEVAR at Harran University Hospital. The preoperative and postoperative data was analyzed retrospectively and the long-term follow-up data was recorded during normal hospital visits at the six month, once a year and thereafter period.

Patients were operated on under Local anesthesia with sedation in a coronary angiography room. For vascular access, the femoral artery was surgically explored, and a guide wire was introduced to the axillary artery. The Endologix® Endologix Powerlink System (Endologix, Inc, Irvine, Calif), Medtronic Vailant Endograft® (Medtronic Vascular, Santa Rosa, California, USA) and Relay NBS Thoracic Stent Graft with

the Plus Delivery System (Bolton Medical, Sunrise, FL) were then implanted (Figure 1).

All patients were fasted for a minimum of 8 hours preoperatively. Premedication with oral midazolam (2 mg) was administered to all patients. A single dose of prophylactic antibiotic was administered on induction. Intra-operative monitoring included electrocardiogram (ECG), arterial blood pressure and trans-cutaneous peripheral oxygen saturation. All patients were given sedation with intravenous midazolam 0.05 - 0.2 mg/kg IV and fentanyl 50-150 microgram IV bolus, and occasionally propofol 25-75 microgram /kg bolus in titrated doses so as to minimize patient movement which can affect imaging and device placement. Oxygen (3L/min) was supplied through a nasal cannula. Local anaesthesia was achieved by infiltrating 2% Prilocain (Prilocain 1%; Astra Zeneca, Wedel, Germany) in the groins and the cut down done in the standard way to identify the common femoral, superficial femoral and profunda femoris arteries which is mobilized and looped (silastic). Insertion of the stent graft and deployment was done under image intensifier (C-arm) as per recommendation of the manufacturers.

RESULTS

Eight patients were enrolled, 6 underwent EVAR and 2 underwent TEVAR procedure under local anesthesia and monitored sedation. Four patients were males and with a mean age of 60.3 years (range 38–82 years). AAAs were symptomatic with abdominal symptoms of pain associated with a pulsatile mass. TEVARs were symptomatic with chest pain and dispnea. The mean maximum diameters of the aortic aneurysms were 73.3 mm (range 58-90 mm). Mean operating time was 162.5 minutes (range 140-185 mins) and the mean post-operative length of hospital stay was 3.2 days (range 3–4 days). There were no patients conversions from local to general anesthesia. All of patients were followed ICU post-operative 12

hours. There was no post-operative mortality in this study. Table 1 shows the patient characteristics, Aneurysms diameter (mm) and postoperative hospital stay. There was no mortality in 30-days follow up. There were no morbidity and renal or respirator complication. One year follow-up all patient no mortality or recurrence was observed in 12 month follow-up.

DISCUSSION

With the present study we pointed-out that:(I) EVAR and TEVAR are safe procedure in critical patient, (II) easily done under local anesthesia and sedation, (III) decreased hospital stay, mortality and morbidity like in the light of the literature.

Minimally invasive techniques gain popularity with decreased mortality, morbidity, and patient discomfort. In vascular surgery, this route has been personified by the technique of endovascular aneurysm repair (EVAR) in first abdominal aorta then thoracic aorta. Patients undergoing aortic surgery have a higher risk of preoperative or postoperative cardiac mortality and morbidity than patients undergoing other nonvascular surgery (7). Physiologic factors associated with this increased incidence of complications include hemodynamic and metabolic changes, fluid changes and blood loss, improved myocardial oxygen exact secondary to stress from surgery and anesthesia, and prolonged anesthetic time. EVAR is performed with minimally invasive techniques and is associated with reduced blood loss and increased hemodynamic stability. Two randomized, controlled trials have shown that EVAR is associated with reduced mortality and morbidity compared with open techniques (8-9). Mortality, postoperative complications, and length of stay are the consequences of surgical and anesthetic techniques, a change in the latter may contribute to reduce morbidity and costs after EVAR. Guidelines of the Society of Vascular Surgery classify the level of approval and

evidence for the use of RA or LA for EVAR as weak or low, respectively (10).

Several studies reported usability of LA in endovascular repair operations. Henretta *et al* showed that no mortality and cardiopulmonary adverse events in 47 patients who underwent EVAR with LA (11). Verhoeven et al. and the European Collaborators on Stent/Graft Techniques for Aortic Aneurysm Repair (EUROSTAR) Registry reported decreased (especially cardiac related) morbidity for LA (7).

Anaesthetic conversion rates from LA to GA vary from 1% to 33% and seem to be lower in centers with more experience in the application of LA in literature. Verhoeven et al. report the lowest anaesthesiological conversion rate of 1%, which compares favourably with our rate of 7.6%. In our cases, there was no need to conversion general anesthesia. A main concern of LA is the issue of airway security, especially when sedation is applied. Reasons for conversion to GA include integrated patient movements in operation caused by discomfort or persistent coughing and also some patient might not capable of holding their breath for a prolonged time period. All these factors affect imaging quality in LA and thus precise endograft placement (7).

Ruppert *et al* in an analysis of the large EUROSTAR database of 5557 cases in 167 centers showed that 310 patients (6%) were done under LA with subsequent significant reduction in ICU and hospital stay with reduced systemic complications (12). In our hospital stay ratio was 3,2 days and in Ruppert *et al* study hospital stay 3,7 days. In our study there were no complications like Ruppert study *et al.* The use of LA prevents mechanical ventilation and permits spontaneous ventilation and reduced post operative respiratory complication and pulmonary morbidity.

Bettex *et al* marked that fluid requirements and vasopressor support were reduced in

post operative care of EVAR patients (13). In our study all of patients were followed 12 hours in ICU in terms of possible complications. There were no intraoperative or postoperative problems in 3rd, 6th and 12th month follow up.

Several limitations of this study should be considered. One of the potential limitations is the absence of comparison with conventional aortic surgery. Another limitation is the small number of patients in the study cohort

In conclusion, LA with sedation in EVAR and TEVAR might be an option in anesthetic management of patients with AAA, TAAA. However, further large scale studies are needed to define the possible favorable effects of LA in clinical study of EVAR patients.

Declaration of conflicting interests

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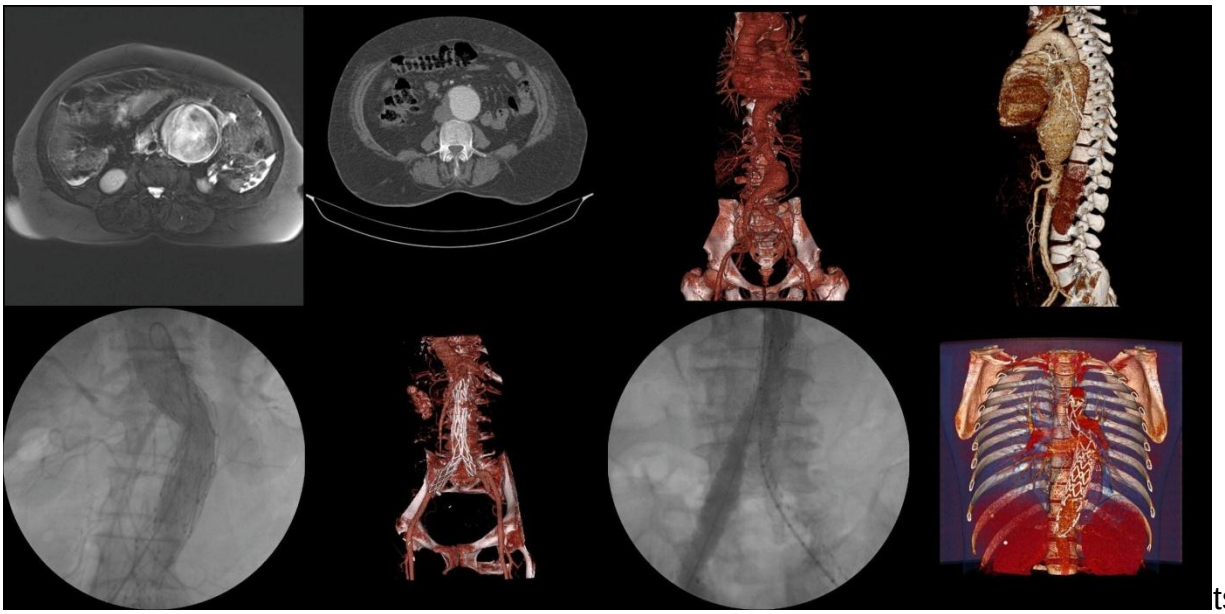
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Figure 1. TEVAR and EVAR images of patien

Table 1. Demographics of patients undergoing EVAR and TEVAR

Age	60.3±12.7 (38-82)
Female sex	%50
Body mass index (kg/m2)	28.1±1.55 (25-30)
ASA score	
I (%)	12.5 (n: 1)
II (%)	25 (n: 2)
III (%)	62.5 (n: 5)
IV (%)	0 (n: 0)
Diabetes	%50
Tobacco use	%50
Hypertension	%87.5
Hyperlipidemia	%37.5
Cardiac disease	%62.5
Carotid disease	%0
Renal disease	%12.5
Obstructive lung disease	%50
Aneurysm size in mm	73.3±10.6 (58-90)
Conversion of anesthesia	%0
Mean operating time was	162.5±33.5
Length of hospital stay days	3.2±0.3 (3-5)

***ASA**: American Society of Anesthesiologists score*

References

1. Paravastu SC, Jayarajasingam R, Cottam R, Palfreyman SJ, Michaels JA, Thomas SM. Endovascular repair of abdominal aortic aneurysm. Cochrane Database Syst Rev. 2014 23;(1):CD004178. doi: 10.1002/14651858.

2. Parodi JC, Palmaz JC, Barone HD. Transfemoral intraluminal graft implantation for abdominal aortic aneurysm. Ann Vasc Surg 1991;5(6):491-9.

3. Abraha I, Romagnoli C, Montedori A, Cirocchi R. Thoracic stent graft versus surgery for thoracic aneurysm. Cochrane Database Syst Rev. 2013;11;9:CD006796. doi: 10.1002/14651858

4. Paravastu SC, Jayarajasingam R, Cottam R, Palfreyman SJ, Michaels JA, Thomas SM. Endovascular repair of abdominal aortic aneurysm. Cochrane Database Syst Rev.2014 Jan 23;(1):CD004178. doi: 10.1002/14651858.CD004178.pub2.

5. Nienaber CA, Fattori R, Lund G, Dieckmann C, Wolf W, von Kodolitsch Y, Nicolas V, Pierangeli A. Nonsurgical reconstruction of thoracic aortic dissection by stent-graft placement. N Engl J Med. 1999; 340(20):1539-45.

6. Cao P, Zannettti S, Parlani G Vernizzi F, CarporaliS, Spaccatini A, et al. Epidural anaesthesia reduces length of hospitalization after endoluminal abdominal aortic aneurysm repair. J Vasc Surg 1999;30(4): 651-7.

7. Verhoeven ELG, Cina CS, Tielliu IFJ, Zeebregts CJ, Prins TR, Eind- hoven GB, *et al.* Local anesthesia for endovascular abdominal aortic aneurysm repair. J Vasc Surg 2005;42: 402-9.

8. Greenhalgh RM, Brown LC, Kwong GP, Powell JT, Thompson SG. Comparison of endovascular aneurysm repair with open repair in patients with abdominal aortic aneurysm (EVAR trial 1), 30-day operative mortality results: randomised controlled trial. Lancet 2004;364:843-8.

9. Prinssen M, Verhoeven EL, Buth J, Cuypers PW, van Sambeek MR, Balm R, et al. A randomized trial comparing conventional and endovascular repair of abdominal aortic aneurysms. N Engl J Med 2004;351:1607-18.

10. Chaikof EL, Brewster DC, Dalman RL, et al. The care of patients with an abdominal aortic aneurysm: the Society for Vascular Surgery practice guidelines. J Vasc Surg 2009;50(4 supp):S2e49.

11. Henretta JP, Hodgson KJ, Mattos MA, Karch LA, Hurlbert SN, Stembarch Y, et al. Feasibility of endovascular repair of abdominal aoric aneurysm with local anaesthesia with intravenous sedation. J vasc Surg 1999;29:793-8.

12. Ruppert V, Leurs LJ, Steckmeier B, *et al.* Influence of anesthesia type on outcome after endovascular aortic aneurysm repair: An analysis based on EUROSTAR data J Vasc Surg 2006;44:16-21.

13. Bettex DA, Lachat M, Pfammatter T, Schmidlin D, Turina MI, Schmid ER. To compare general, epidural and local anaesthesia for endovascular aneurysm repair (EVAR). Eur J Vasc Endovasc Surg. 2001;21(2):179-84.