

# Endovascular Aneurysm Repair (EVAR) for infra-renal Abdominal Aortic Aneurysm(AAA) under Local Anaesthesia - Initial Experience in Hospital Kuala Lumpur

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## SUMMARY

This is our initial report on the first 4 cases of infra-renal abdominal aortic aneurysms undergoing Endovascular Aneurysm Repair (EVAR) with local anaesthesia, controlled sedation and monitoring by an anaesthetist. All 4 patients were males with a mean age of 66.7 years. Only one (1) required ICU stay of 2 days for cardiac monitoring due to bradycardia and transient hypotension post procedure. No mortality or major post operative morbidity was recorded and the mean hospital stay post procedure was 3.5 days (range 2-5 days).

## KEY WORDS:

*Endovascular Aneurysm Repair (EVAR), infrarenal abdominal aortic aneurysm and local anaesthesia*

## INTRODUCTION

Endovascular aneurysm repair (EVAR) was first introduced in 1990 as a minimally invasive procedure alternative to the conventional open surgical repair, with the aim to reduce mortality and morbidity<sup>1</sup>. Presently EVAR has become an acceptable treatment option for patients with infra-renal aortic aneurysms (AAA) and in some centers the first line option in anatomically suitable AAA<sup>2</sup>. It has been proven to reduce certain classes of morbidity and hospital length of stay with conflicting results regarding reduction in mortality rates<sup>3</sup>. Various anaesthetic techniques have been used for EVAR which include general anaesthesia (GA), regional (epidural and spinal anaesthesia) and local anaesthesia (LA) with or without monitored anaesthesia care<sup>4, 5</sup>. The introduction of the device is usually through a trans-femoral route via a groin incision or by a percutaneous technique therefore eliminating the need for cross clamping of the aorta and hence avoiding the complications associated with cross clamping. This surgical approach makes local anaesthesia possible as an anaesthetic technique and eliminates the potential risk of mortality and morbidity of general anaesthesia. A few authors have reported the feasibility of the use of local anaesthesia with sedation for EVAR. Henretta et al reported no operative death or cardiopulmonary adverse events in 47 patients who underwent EVAR with LA<sup>5</sup>. Verhoeven et al also reported on the safety of local anaesthesia for EVAR and associated improvement in pulmonary morbidity and decreased hospital stay<sup>6</sup>.

The aim of this report is to highlight our preliminary experience in four patients with infra-renal aortic aneurysm who underwent EVAR using LA.

## MATERIALS AND METHODS

This is a retrospective review of patients with infra-renal abdominal aortic aneurysm (AAA) who underwent an EVAR procedure under LA during the period between January 2011 to 30th September 2011. All data were obtained from patient's records, and it included the demographics, morphology of AAA, co-morbidities, American Society of Anaesthesiologist (ASA) classification, length of postoperative stay, ICU admission, 30-day post operative mortality and morbidity.

Prior to surgery, all patients underwent routine pre-operative anaesthetic clinical assessment. The patients were all informed regarding the risk and benefits of EVAR procedure and the potential for conversion to GA or open surgery and long term follow-up. Selection of the patients was decided by the consultant vascular surgeon based on the poor respiratory and cardiac status of the patients making GA a much higher risk. Preoperative assessment, planning, axial length of aneurysm and graft size measurements were done by the operating team using CT angiogram with image reconstruction software.

### Operative Technique

All procedures were done by a team comprising vascular surgeons, radiographer and anaesthesiologists in an operation theatre setting equipped with digital C-arm image intensifier. The stent grafts were introduced via bilateral femoral cut-down. The stent grafts used were all ENDURANT® AAA Stent Graft System (Medtronic Santa Rosa, USA).

All patients were fasted for a minimum of 8 hours pre-operatively. Premedication with 2 mg oral midazolam was administered to all patients. A single dose of prophylactic antibiotic was administered on induction. Intra-operative monitoring included electrocardiogram (ECG), arterial blood pressure, trans-cutaneous 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

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Table I: Co-morbidities of the 4 patients and the main reason for selecting local

Case No.	Co-Morbidities	Reason for LA/Sedation
1	<ul style="list-style-type: none"> <li>• Diabetes Mellitus</li> <li>• IHD with h/o congestive cardiac failure</li> <li>• ECHO shows global hypokinesia</li> <li>• Dyslipidemia</li> <li>• History of(h/o) smoking</li> <li>• ASA III</li> </ul>	<ul style="list-style-type: none"> <li>• Congestive cardiac failure on digoxin with poor left ventricular failure</li> </ul>
2	<ul style="list-style-type: none"> <li>• Diabetes Mellitus</li> <li>• Hypertension</li> <li>• Dyslipidemia</li> <li>• h/o Smoking</li> <li>• ASA II</li> </ul>	<ul style="list-style-type: none"> <li>• Recent h/o hospital acquired pneumonia still receiving treatment</li> </ul>
3	<ul style="list-style-type: none"> <li>• IHD with CABG in 2001</li> <li>• Pulmonary Tuberculosis (completed treatment 6 months earlier)</li> <li>• Pulmonary fibrosis</li> <li>• ASA II</li> </ul>	<ul style="list-style-type: none"> <li>• Pulmonary fibrosis with mild restrictive lung disease and recent h/o pulmonary tuberculosis</li> </ul>
4	<ul style="list-style-type: none"> <li>• Hypertension</li> <li>• Dyslipidemia</li> <li>• h/o smoking</li> <li>• Bilateral renal calculi</li> <li>• ASA II</li> </ul>	<ul style="list-style-type: none"> <li>• Hemodynamically unstable during induction of general anaesthesia for first attempt at open aneurysectomy</li> </ul>

(h/o = history of)

imaging and device placement. Oxygen (3L/min) was supplied through a nasal cannula. Local anaesthesia was achieved by infiltrating 2% Lignocaine/Marcaine in the groins and the cut down done in the standard way to identify the common femoral, superficial femoral and profunda femoris arteries which was 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

There were four (4) patients who underwent the EVAR procedure under local anaesthesia and monitored sedation between June to August 2011. All were males with a mean age of 66.7 years (range 57 – 74 yrs) and were symptomatic with abdominal discomfort or pain associated with a pulsatile mass. The mean maximum diameter of the aortic aneurysms was 5.55cm (range 4.2-6.5 cm). Mean operating time was 142.5 minutes (range 125-160 mins) and the mean post operative length of hospital stay was 3.5 days (range 2 – 5 days). Only one (1) patient required post operative ICU monitoring due to a short period of hypotension and bradycardia post extubation in OT. There was no post operative mortality in this study. Table 1 shows the co-morbidities and main reasons for choosing LA including ASA classification.

## DISCUSSION

This retrospective review showed EVAR with LA has showed a very encouraging outcome in terms of safety, reduced length of post-operative stay, reduced ICU admission, reduced postoperative monitoring and postoperative morbidity in our local setting. Henretta *et al*<sup>5</sup> reported no operative death or cardiopulmonary adverse events in 47 patients who underwent EVAR with LA.

A more recent and larger review of EVAR comparing different modalities of anaesthesia by Geisbusch *et al*<sup>7</sup> reviewed consecutively 217 patients over 44 months undergoing EVAR and found that 187 pts (84%) were suitable for LA with conversion to open in 14 patients only (7.6%) and mortality rate of 2.7%. The authors however did note that the Type I endoleak was found only in cases undergoing EVAR under LA and they postulate that accurate placement and deployment of the stent graft is slightly compromised due to respiratory and patient movement and they suggest that challenging aneurysm anatomy to be a relative contraindication to EVAR under LA. If iatrogenic rupture occurs, this can be dealt with either with endovascular stenting or open repair. Open repair would require conversion to GA. Conversion will also be required if the patient becomes uncooperative or unable to keep still during the critical phase of deployment of the device.

Ruppert *et al*<sup>8</sup> in an analysis of the large EUROSTAR database of 5557 cases in 167 centers found that 310 patients(6%) were done under LA with subsequent significant reduction in ICU and hospital stay with reduced systemic complications.

The use of local anaesthesia avoids mechanical ventilation and allows spontaneous ventilation therefore reducing the patient's exposure to factors that increase the risk of post operative respiratory failure and reduces the risk of pulmonary morbidity.

Bettex *et al*<sup>9</sup> in his study noted lower fluid requirements and vasopressor support resulting in lower need for ICU post operative care. In our study only one required post operative ICU care due to transient hypotension and bradycardia shortly after completion of the procedure. This was the patient that had poor cardiac function and history of congestive cardiac failure on digoxin. An internal department audit of EVAR done in our department in 2010

showed that there were 17 cases of which 7 were for elective infra renal AAA of which only 2 cases required ICU stay of 1 and 3 days respectively but post operative stay of was much longer with a mean of 6 days (range 2 - 10 days) whereas the LA group was mean of 3.5 days (range 2-5 days). All patients undergoing open repair required ICU stay.

Post operative surveillance is similar to patients undergoing EVAR under GA i.e first CT within a month if there were no problems intra-operatively followed by a 3 months, 6 months and yearly CT scan if no complications are detected.

Concerning the pain control, majority of patients required only oral non-steroidal anti-inflammatory medication. This is possibly due to the effect of preemptive analgesia exerted by the infiltration of local anaesthetic agent<sup>6</sup>.

The limitation of this initial report is that there were only a small number of patients in the study cohort and we will require a larger cohort to compare the efficacy and outcome of this technique with other larger studies in our center.

#### CONCLUSION

This initial study showed that the use of local anaesthesia in EVAR in a tertiary vascular center in selected cases is safe and is associated with a reduction in ICU admission and postoperative hospital stay.

#### REFERENCES

1. Parodi JC, Palmaz JC, Barone HD. Transfemoral intraluminal graft implantation for abdominal aortic aneurysm. *Ann Vasc Surg* 1991; 5: 491-9.
2. Albuquerque Jr FC, Tonnessen BH, Noll Jr RE, et al. Paradigm shift in the treatment of abdominal aortic aneurysm: trends in 721 patients between 1996 and 2008. *J Vasc Surg* 2010; 51: 1348-52.
3. De Bruin JL, Bass AF, ButhJ, Prinssen M, Verhoeven EL, Cuypers PWet al. Long- term outcome of open or endovascular repair of abdominal aortic aneurysm. *N Engl J Med* 2010; 362: 1881-9.
4. Cao P, Zannetti S, Parlani G Vernizzi F, CorporaliS, Spaccatini A, et al. Epidural anaesthesia reduces length of hospitalization after endoluminal abdominal aortic aneurysm repair. *J Vasc Surg* 1999; 30: 651-7.
5. Henretta JP, Hodgson KJ, Mattos MA, Karch LA, Hurlbert SN, Stembarch Y, et al. Feasibility of endovascular repair of abdominal aortic aneurysm with local anaesthesia with intravenous sedation. *J vasc Surg* 1999; 29: 793-8.
6. Verhoeven ELG, Cina CS, Tielliu IFJ, Zeebregts CJ, Prins TR, Eindhoven GB, et al. Local anesthesia for endovascular abdominal aortic aneurysm repair. *J Vasc Surg* 2005; 42: 402-9.
7. Local Anaesthesia for Endovascular Repair of Infrarenal Aortic Aneurysms P Geisbu'sch , BT Katzen, R Machado, *et al.* *Eur J Vasc Endovasc Surg* 2011; 42: 467-73.
8. Influence of anesthesia type on outcome after endovascular aortic aneurysm repair: An analysis based on EUROSTAR data Ruppert V, Leurs LJ, Steckmeier B et al. *J Vasc Surg* 2006; 44: 16-21.
9. Bettex DA, Lachat M, Pfammatter T, Schmidlin D, Turina MI, Schmid ER. To compare general, epidural and local anesthesia for endovascular aneurysm repair (EVAR). *Eur J Vasc Endovasc Surg* 2001; 21: 179-84.