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SHORT REPORT

# The One-Stop Aortic Surveillance Clinic

**B. Renwick** [a,*], **C.J. Beattie** [b], **K. Khan** [a], **M. Mirghani** [a], **R. Velu** [c], **D.B. Reid** [a], **D.J. Bain** [a]

[a] Hairmyres Hospital, Glasgow, UK
[b] Glasgow University Medical School, Glasgow, UK
[c] Wishaw General Hospital, Wishaw, UK

**Background:** The principle of interval ultrasound surveillance of small abdominal aortic aneurysms (AAA) is well established. The fundamental principle of surveillance is that repair of AAA is a serious undertaking and the risk of the operation outweighs the risk of rupture in aneurysms less than 5.5 cm. Surveillance is well established but requires multiple visits to both the surgical clinic and the ultrasound department.
**Report:** This report presents a system whereby the vascular surgeon is trained in the process of aortic sonography with a view to one-stop clinic assessment. After training of the main investigators in aortic sonography, the surgeons performed scans on the aortas of 80 consecutive patients and compared the scan result with the subsequent formal scan.
**Discussion:** Surgical and radiographer scans correlate very closely. It is believed that the one-stop aortic surveillance model is safe, accurate, and improves both the patient journey and clinic throughput.

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## INTRODUCTION

The principle of interval ultrasound surveillance for small abdominal aortic aneurysms (AAA) is well established. The fundamental principle of surveillance is that repair of AAA is a serious undertaking and the risk of the operation outweighs the risk of rupture in aneurysms less than 5.5 cm.[1] This leads to a significant number of patients attending the outpatient clinic for surveillance until they reach treatment threshold. It was felt that the current system of surveillance was cumbersome and required streamlining.

Previous practice at the study unit involved a patient with a known aneurysm attending clinic. If they were very frail, with minimal predicted survival benefit from AAA repair, they were counselled and discharged. However, the majority underwent serial clinical examination and were referred for a radiology department ultrasound at a later date. The departmental report was then sent to the relevant surgeon who generated a letter to the patient and GP detailing further action and follow-up. The local protocol for surveillance is provided in Table 1.

This is clearly a multi-stage process. It involves two visits to hospital and delays formation of a robust management plan, either continued sonographic surveillance or further cross-sectional imaging, with a view to repair. Furthermore, it delays patient reassurance, for those with sub-threshold aneurysms, and any missed ultrasound appointment generates further delay.

This report proposes a system whereby the vascular surgeon is trained in the process of aortic sonography with a view to one-stop clinic assessment.

## REPORT

Local ethical approval was obtained.

The two main investigators (BR, DJB) attended a 3-day vascular sonography course (Wessex medical ultrasound course, www.wessexscientific.com). This covered technique, limitations, and pitfalls during sonographic assessment of the abdominal aorta, as well as hands-on practical sessions.

Subsequently, 86 consecutive patients attending clinic for AAA surveillance were scanned by the attending surgeon. The scan was performed without prior knowledge of any previous ultrasound result. All patients were scanned using the local protocol of maximum AP diameter, with an average of three measurements on the outer wall-outer wall measurement during cardiac systole.[2] The patients were informed of the provisional sonographic result and a departmental scan arranged as usual.

The surgical measurement and radiographer measurement were then crosschecked for accuracy. The results were subjected to Bland–Altman analysis of correlation.

A note of a potentially difficult scan was made in poor sonographic subjects. This included patients with obesity, upper midline laparotomy or rooftop incisions and severe

* Corresponding author. Hairmyres Hospital, Eaglesham Road G75 8RG, Scotland, UK.
*E-mail address:* brycie@doctors.net.uk (B. Renwick).

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**Table 1.** Interval of USS surveillance dependant on AAA sac size.

| Size of AAA (maximum AP diameter) | Suggested ultrasound follow-up interval |
|---|---|
| 3—4 cm | Yearly |
| 4—5 cm | 6-monthly |
| 5—5.5 cm or evidence of rapid sac expansion | 3-monthly |
| >5.5 cm | Proceed to cross-sectional imaging |

kyphoscoliotic disease. These are patients at "high risk" of an inaccurate ultrasound result. If the aorta could not be accurately and safely visualised, the patients were excluded from the study and a departmental scan expedited.

The aneurysms of 86 patients attending the clinic over an 18-month period were scanned at the bedside. In five patients the aorta could not be accurately visualised and were therefore not included in the analysis. The scans of 81 patients were correlated with the departmental scan and the Bland—Altman test applied.

Mean difference between sonographer and vascular surgeon measurements was 1.06 mm (95% CI 0.56—1.56, using t[5%, 80]). The 95% limits of agreement = mean $\pm$ 2 $\times$ SD = 1.06 $\pm$ 4.58; the 95% limits of agreement = −3.52 to 5.64.

In summary, the measurements by surgeons and sonographers correlate well (Fig. 1). The surgeons in this study tend to overestimate AAA sac size by a single millimetre.

## DISCUSSION

The principle of non-sonographers performing aortic ultrasound is well established. It has been proven to be safe, effective, and accurate providing the operator has been properly trained and undergoes a quality assurance process.[3]

Clinicians trained in aortic sonography bring several benefits to the department. The need for a second hospital visit for surveillance scanning is abolished in most cases; the exceptions are the minority of patients with sonographically inaccessible aortas or those requiring a CT scan on size grounds. Furthermore, having a scan at clinic may increase follow-up rates; aortic screening has been shown to have a 40% non-attendance rate in some studies.[4] A one-stop clinic may increase follow-up rates and therefore decrease rupture rate.[5]

Having sonographically trained surgeons has implications for the wider surgical service. Being skilled in bedside aortic sonography is an invaluable tool in assessing the acute abdomen in the emergency department or ICU setting, and may guide assessment.[6] Skill in aortic ultrasound is also complementary to other skills acquired by the modern vascular interventionist including carotid, common femoral and superficial venous scans.

The availability of senior anaesthetic staff availability is a key asset in the one-stop clinic. On discovering an aneurysm above 5.5 cm it is possible to start the (sometimes complex) anaesthetic workup and allows multidisciplinary assessment at an early stage.

Interestingly, the above protocol may involve over-rigorous surveillance intervals. It may be safe to scan less frequently, especially in smaller aneurysms.[7]

Finally, it should be noted that of all 81 patients enrolled in the study, no patients with aneurysms of 5.5 cm or greater would have had delayed cross-sectional imaging as

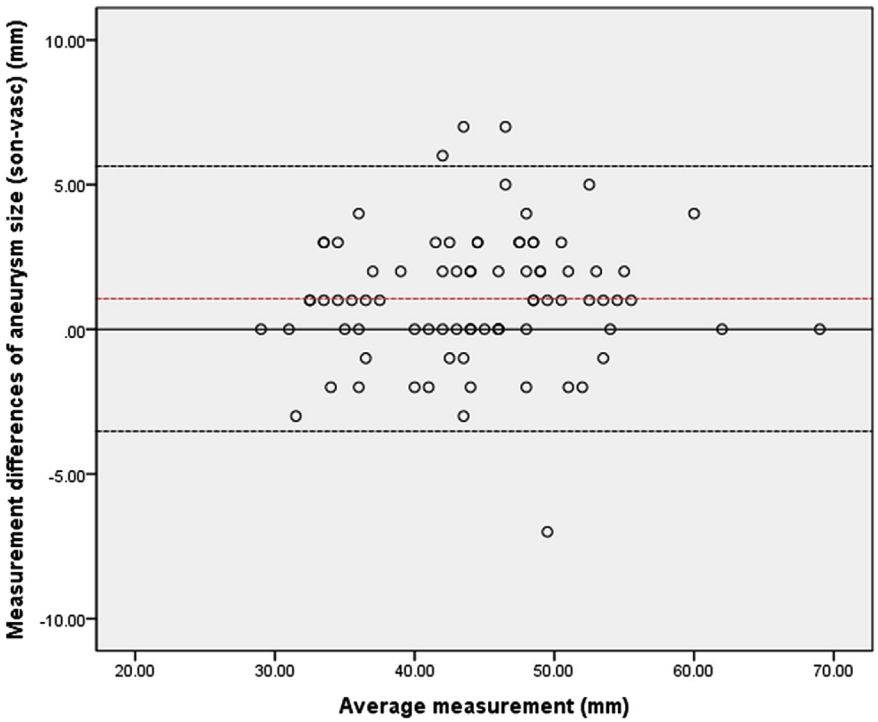


**Figure 1.** Bland—Altman plot of sonographer (Son) versus surgical (Vasc) measurements.

a result of the one-stop clinic. It is of interest to note that surgeons have a tendency to overestimate aneurysm sac size by a single millimetre.

The results show an accurate correlation between the surgical and radiographer ultrasound examinations. The NHS Lanarkshire one-stop aortic assessment clinic is safe, reliable and provides a smoother patient journey in comparison with the previous clinic setup.

## CONFLICT OF INTEREST

None.

## FUNDING

None.

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