Original Article

An audit of routine grey scale sonograghic imaging for pelviureteric junction obstruction: Do they identify lower polar vessels?

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ABSTRACT

Background: Aberrant lower polar vessels are uncommon causes of pelviureteric junction (PUJ) obstruction. Preoperative identification would help in planning the appropriate procedure. We attempted to determine whether routine investigations would predict crossing lower polar vessels. **Materials and Methods:** This was a retrospective study of 20 patients that either had ultrasonographic investigation by a radiologist who was blinded to the aetiology of PUJ obstruction, or underwent minimal access surgery for PUJ obstruction, from 2005 to 2007, in the Birmingham Children's Hospital, UK. **Results:** There were 20 patients with PUJ obstruction, 8 were found at operation to have crossing lower polar vessels causing PUJ obstruction. The sonography correctly identified crossing vessels in only one, with a sensitivity of 12.5%, specificity of 66.6%, positive predictive value of 20%, and negative predictive value of 53%. **Conclusion:** Preliminary results showed that none of these investigations could reliably identify lower polar vessels.

Key words: Pelviureteric junction obstruction, lower polar vessels, ultrasonography

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INTRODUCTION

Aberrant lower polar crossing vessels, as a cause of pelviureteric junction (PUJ) obstruction, have a reported incidence between 11–49%.[1] Vascular relocation has been proposed as an effective procedure for crossing vessels causing hydronephrosis.[2,3] The ability to diagnose lower polar crossing vessels preoperatively, as the cause of PUJ obstruction, is a substantial advantage, as the surgical procedure (pyeloplasty *vs.* vascular relocation), position of the patient, and port placement can be planned in advance.

In this study, we examined the accuracy of routine preoperative ultrasonography in identifying crossing vessels as the cause of PUJ obstruction in children.

MATERIALS AND METHODS

A retrospective review of children with PUJ obstruction who underwent minimal access surgery from 2005–2007 was undertaken. Ultrasonographic images were retrieved and reviewed by the radiologist, who was blinded to the operative findings.

The presence of the "beak sign" (visualisation of the dilated proximal ureter) on sonography, was considered, to be predictive of crossing vessels.

The results were compared with the operative findings to determine the accuracy of the prediction. Other radiological investigations such as nuclear scan and retrograde pyelography were also reviewed to see if it was possible to identify the obstructing vessels.

RESULTS

Over a period of three years (2005–2007), 20 children underwent minimal access surgery for PUJ obstruction in the institution. Of these, 11 were boys and 9 were girls. Age range was between 6–17 years (mean = 11.3 years, median = 11 years).

Only half the patients had the investigations performed in our Institute, the rest brought films from their referring hospitals. None of them had Doppler sonographic images. Our radiologist interpreted the images as showing that five children had crossing vessels. Intraoperatively, 8 (40%) children had aberrant vessels; the radiologist's preoperative diagnosis was correct only in one.

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Out of 12 who did not have crossing vessels intraoperatively, the radiologist's diagnosis concurred in four, giving a sensitivity of 12.5%, specificity of 66.6%, positive predictive value of 20%, and negative predictive value of 53%. We could not confidently identify crossing vessels in any one of the children from the nuclear scans. With regard to the retrograde pyelography study performed on table during surgery, only two out of eight cases could be correctly identified.

DISCUSSION

Recently, use of advanced imaging such as computed tomography angio (CTA), magnetic resonance angio (MRA), andendoluminal USG has been proposed to diagnose the crossing vessels. However, they are either costly or invasive or require prolonged imaging under sedation, sometimes requiring in-patient stay. There is evidence that Doppler ultrasonography is effective in identifying crossing vessels,[4,5] because of visual representation of flow in the vessel, without the added draw backs of cost, sedation, and invasiveness. According to Veyrac *et al*.[4] the sensitivity (100%), specificity (87.5%), PPV (81.8%), NPV (100%) of Doppler sonography to reliably detect crossing vessels, is reportedly high.

The criteria used to investigate the accuracy of ultrasonography to detect crossing vessels were based on the findings of Rooks and Lebowitz.[1]

There was a poor co-relation between the radiologist's interpretation and the intraoperative findings.

A number of factors could be responsible for this result. Some of the patients had undergone imaging elsewhere without the use of Doppler, which would have improved the detection of crossing vessels. Also, the beak sign on ultrasonography, which predicts the presence of lower pole vessel, was not specifically seen by the previous imaging technicians, accounting for the interobserver variability.

We conclude that routine grey scale ultrasonography alone cannot possibly identify crossing lower polar vessels in PUJ obstruction. However, addition of Doppler to the imaging, performed by an experienced radiologist may improve the accuracy of detecting crossing vessels in a high proportion of patients. We plan to undertake a prospective study looking into the utility of Doppler in correctly detecting the lower polar vessels.

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