Ultrasound versus MRI of the groin:
A retrospective study

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Introduction

Most inguinal and femoral hernias are diagnosed with a thorough history and physical examination; however, imaging, including ultrasonography (US), computed tomography (CT), and magnetic resonance imaging (MRI) can provide a definitive diagnosis. Ultrasound is non-invasive, readily available, cost-effective with no ionising radiation, and should include a manoeuvre to increase intra-abdominal pressure.

MRI is expensive, less available and can assist in the differentiation of sports-related injuries versus inguinal hernias. CT is useful for complex hernias.

This study aims to identify whether ultrasound and MRI are comparable for detecting groin hernias. The audit was performed to understand why patients had referrals for different imaging modalities, and why some had appointments for ultrasound and MRI on the same day. Is there correlation between external and inhouse imaging?

Ultrasound using dynamic real-time imaging with Valsalva is accurate in diagnosing inguinal and femoral hernias; however, ultrasound is operator and equipment dependent. MRI can demonstrate soft tissue abnormalities if the diagnosis of hernia is uncertain (for example, adductor tendon tears).

Image 1: Benenden Hospital MRI Scanner

Image 2: Benenden Hospital Ultrasound System

Method

37 patients had MRI and ultrasound for a suspected groin hernia[1] over a twenty month period. Ultrasound scans included straining/Valsalva technique. MRI scans did not include a straining sequence. 23 patients had already had a previous ultrasound by an external provider, and those results were incorporated into this audit.

All US and MRI reports performed at Benenden Hospital were reviewed alongside external ultrasound studies and any subsequent surgical findings.

Comparison is made with post-imaging consultation/surgical follow-up using information obtained from patient notes/consultation letters.

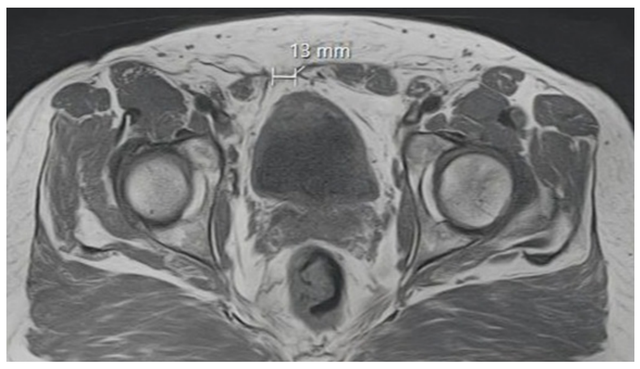


Image 3: MRI right inguinal hernia Patient A

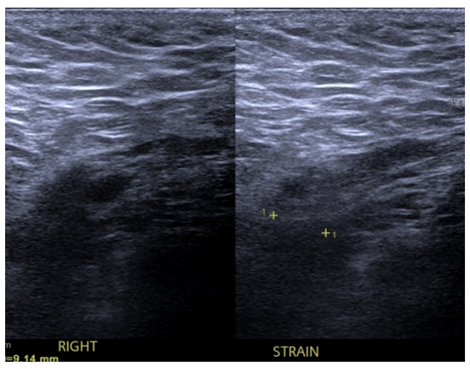


Image 4: Ultrasound right inguinal hernia Patient A

Results

MRI and ultrasound reports correlated in only 46% of patients; of these, 41% agreed on a hernia present (figure 1), 59% agreed on absence of a hernia (figure 2). In the reports that did not correlate, 90% were positive for hernia on ultrasound, and negative on MRI (figure 4)[2] .

External ultrasound reports[3] had 91% correlation with Benenden Hospital ultrasound (figure 3).

Additional pathology noted on both ultrasound and MRI included lymphadenopathy and c-section endometrioma. MRI-only findings included diverticulosis, adductor tendon strain, and degenerative changes to the symphysis pubis.

9 patients underwent groin surgery, all 9 were positive on ultrasound, only 3 were positive on MRI (6 were negative).

4 patients positive for hernia on both ultrasound and MRI had no surgery conservative management only, after discussion with the surgeon.

No MRI +ve/ultrasound –ve patients underwent surgery.

9 patients had no surgery based on the negative MRI (all 9 had +ve ultrasound reports).

Figure 1 – Results correlating for positive for hernia present in the report

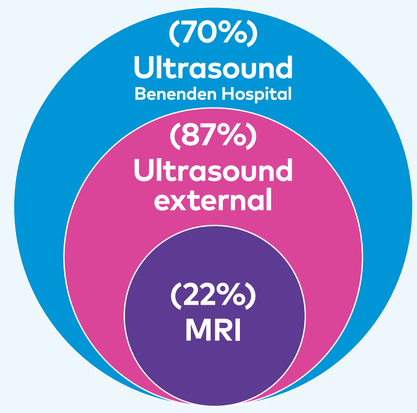
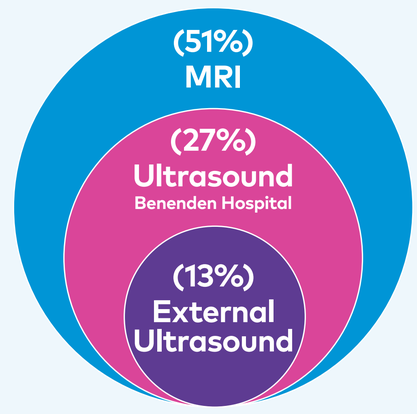


Figure 2 - Results correlating for negative for hernia in the report



Conclusion

Ultrasound in this audit has greater positive prediction than MRI for detecting groin hernias and should be the first-line imaging modality.

Imaging preference among referring consultants may vary due to interpretation differences. Our ultrasound protocol now includes cine sequences to visually demonstrate hernias, and we include in the report whether we can see the hernia at rest and/or straining.

The MRI protocol at Benenden Hospital did not use Valsalva; a straining sequence has since been incorporated into routine practice.

Change of practice will assist peer review audit as easier image interpretation.

MRI is the modality of choice for soft tissue groin abnormalities if a hernia is excluded.

[1] 49% of patients had MRI and ultrasound at Benenden Hospital on the same day.

[2] Ultrasound detected 51% more hernias than MRI (figure 4.)

[3] Available in 62% of patients

Results of Data Analysis

	Ultrasound	MRI	CT
Operator Dependent	✓	✗	✗
Availability	✓ Readily available	✓ Less availability	✓ Less availability
Cost	✓ Cost effective	✗ Expensive	✗ More expensive
Ionising Radiaton	✗	✗ Strong Magnet	✓ ✓ ✓
Dynamic Imaging	✓ ✓ ✓	✗	✗
Other advantages	• Reported instantly • Quick • Non-invasive	Differentiation ofsports-related injuries versus inguinal hernias	Useful for complex hernias

Figure 3 – Comparison of Benenden Hospital ultrasound reports with external ultrasound reports

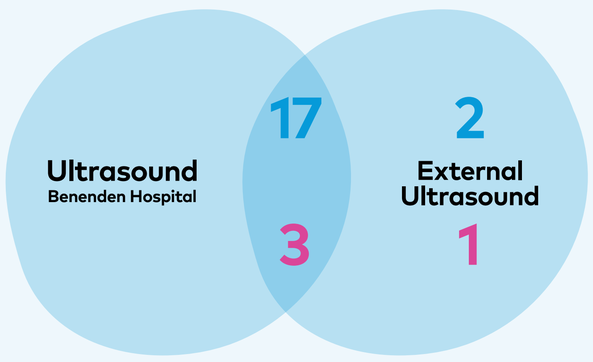
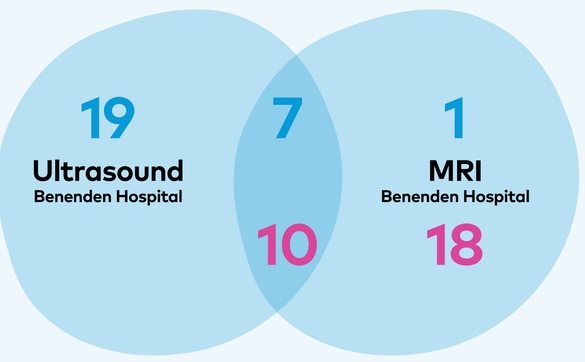


Figure 4 – Benenden Hospital ultrasound versus MRI results



Key: Positive for hernia report Negative for hernia report

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