



Original article

The groin hernia – an ultrasound diagnosis?

Mike Bradley¹, D Morgan², B Pentlow², A Roe²

Departments of ¹Radiology and ²Surgery, North Bristol Trust, Southmead Hospital, Bristol, UK

Aims: Ultrasound is a non-invasive, non-ionising radiation modality which is highly successful at soft tissue imaging. Groin pain from an occult hernia can be a difficult clinical diagnosis made easier by good imaging. The aim of this study was to demonstrate the accuracy of ultrasound in diagnosing and typing the groin hernia, which could lead to its justification of use in the imaging of the occult hernia.

Patients and Methods: A total of 118 patients with a clinical diagnosis of a groin hernia, prospectively underwent a blinded, ultrasound examination of the groin. All patients underwent surgery and these findings were compared with the ultrasound results.

Results: 120 symptomatic groins in 118 patients underwent surgery. Ultrasound diagnosed 118 hernias and there were two normal ultrasound examinations. Surgery confirmed the same two patients to be normal – ultrasound sensitivity for all hernias was 100% with 100% specificity. Two femoral hernias were seen in this study, both correctly identified at ultrasound. Of the inguinal hernias, ultrasound identified 36 of 42 direct hernias (sensitivity 86%, specificity 97%) and 72 of 74 indirect hernias (sensitivity 97%, specificity 87%)

Conclusions: This study confirms that ultrasound can accurately diagnose groin hernias and this may justify its use in the assessment of the occult hernia.

Key words: Groin – Hernia – Ultrasound – Occult hernia – Femoral – Inguinal

Pain in the groin is a relatively common condition, but may prove a difficult diagnosis as the clinical signs are frequently incomplete and so imaging has a role in the diagnosis. Herniography has been described as a useful tool in the investigation of the occult hernia with sensitivity up to 96.6% and specificity of 98.4%.¹ Ultrasound, however, has excellent inherent soft tissue contrast and resolution lending itself as a possible contender for groin evaluation, yielding correct hernia diagnosis in 68 out of 70 patients in one study.² It is lower in cost and is not only non-invasive but also does not involve any ionising radiation. The aim of this study was to describe the accuracy of ultrasound in the diagnosis of

the groin hernia so as to determine whether it rivals other diagnostic imaging.

Patients and Methods

A total of 118 consecutive patients were referred prospectively for ultrasound examination of both groins after a surgical management decision had been made. The ultrasound was conducted blind to the surgical assessment, examining both groins per patient, within 2 weeks of the surgery. The symptomatic groin was unknown to the sonologist. All patients gave informed consent, and formal ethics approval for the study was obtained.

Correspondence to: Dr Mike Bradley, Department of Radiology, North Bristol Trust, Southmead Hospital, Westbury on Trym, Bristol BS10 5NB, UK.

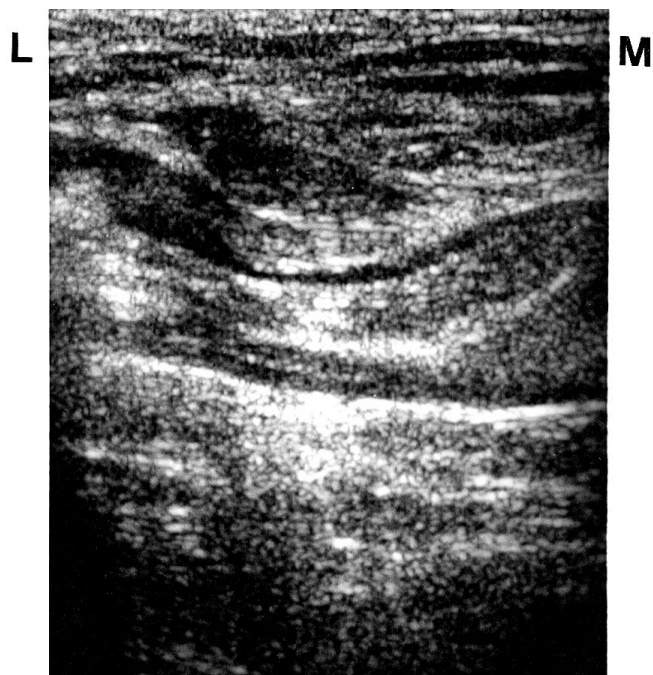


Figure 1 Transverse section showing a right indirect inguinal hernia sac containing bowel.

Landmark anatomy was demonstrated – the inguinal ligament, femoral canal, inguinal canal with content of spermatic cord or round ligament, inferior epigastric vessels, conjoint tendon, deep and superficial inguinal rings. All patients were scanned supine in the relaxed state as well as during coughing and during a valsalva manoeuvre.

The ultrasound criteria for a hernia were: (i) hernial sac containing omentum or bowel with a cough impulse (Fig. 1); or (ii) appearance of hernial sac on valsalva manoeuvre.³ These appearances in the femoral canal (medial to the femoral vessels and inferior to the inguinal ligament) were determined to be a femoral hernia. Inguinal hernias were seen superior to the inguinal ligament. The indirect/direct types were diagnosed, respectively, when the sac was seen lateral/medial to the inferior epigastric vessels (Fig. 2).

Table 1 Ultrasound results compared to the surgical diagnosis in 120 symptomatic groins

	Ultrasound		Surgery		Total
	Femoral	Direct	Indirect	Normal	
Femoral	2				2
Direct		36	2		38
Indirect		6	72		78
Normal				2	2
Total	2	42	74	2	120

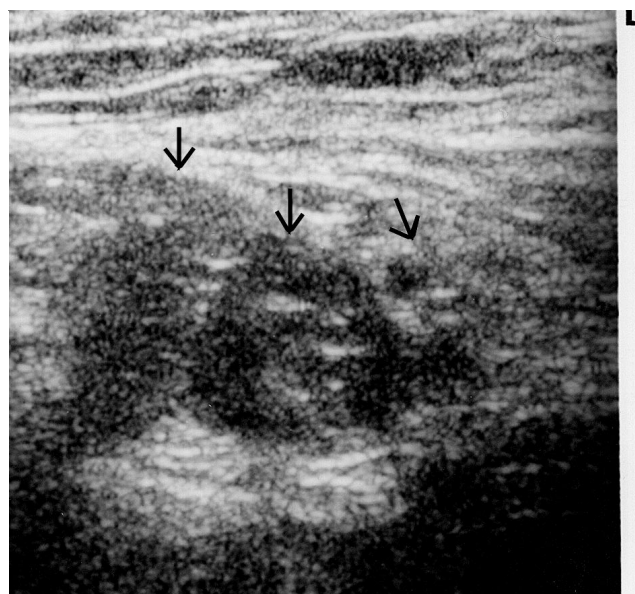


Figure 2 Transverse section of a left direct inguinal hernia arising medial to the inferior epigastric vessels with strain impulse in the anterior direction. Arrows showing hernia and vascular plane.

Results

There were 106 males and 12 females, with an age range of 28–90 years (median, 65 years). In 114 patients, unilateral hernias were positively diagnosed, with two further patients having bilateral symptomatology yielding a total of 118 hernias. The results are summarised in Table 1.

Ultrasound diagnosed 118 hernias with two normal ultrasound examinations. Surgery confirmed the same two patients to be normal – ultrasound sensitivity for all hernias was 100% with 100% specificity. Two femoral hernias were correctly identified at ultrasound. Of the inguinal hernias, ultrasound identified 36 of 42 direct hernias (sensitivity 86%, specificity 97%) and 72 of 74 indirect hernias (sensitivity 97%, specificity 87%).

Discussion

Magnetic resonance imaging (MRI) has been shown to demonstrate accurately groin hernias as well as many other causes of pain, but it is less readily available and more costly.^{4,5} MRI does have advantages over ultrasound in assessing marrow oedema as well as providing more reproducible anatomical planes. However, the authors suggest that if the landmarks set out in this paper are imaged at the ultrasound examination, then the accuracy should be reproducible across sonographers.

Real-time ultrasound has been used in the diagnosis of the ‘sportsman’s groin’,⁶ as well as other inguinal pathology,

e.g. hydrocoele of canal of Nuck, lipoma of the cord, and enlarged lymph nodes.⁷ False positives for hernia may arise when there is a patent processus vaginalis as the majority of children with this will not develop a hernia.⁸

Van Den Berg *et al.*⁵ evaluated ultrasound and MRI against a surgical outcome for inguinal hernias. Their physical examinations showed one false-positive result yielding a sensitivity of 74.5% and specificity of 96.3%. Ultrasound and MRI showed similar sensitivity and specificity of 92.7%, 81.5% and 94.5%, 96.3%, respectively. Ultrasound in the present study diagnosed all the hernias (sensitivity and specificity 100%) and correctly sorted out the inguinal from femoral types. There were no false negatives for hernia diagnosis – the surgery agreed with the ultrasound in two patients thought to be normal even after a positive clinical assessment. Babkova and Bozhko⁷ demonstrated a sensitivity of 84.3% and 71.1% for indirect and direct hernias, respectively. There was a similar discrepancy in distinguishing direct and indirect hernias in this study. The explanations for these slight differences were patient obesity, size of hernia, and difficulty in assessing the location of the inferior epigastric vessels in relation to the hernia sac. Real-time ultrasound allows a dynamic examination, demonstrating the cough or strain impulse which may increase its accuracy over other modalities.

Acknowledgement

The authors thank Kate Parry of the research and development support unit.

References

1. Sutcliffe JR, Taylor OM, Ambrose NS, Chapman AH. The use, value and safety of herniography. *Clin Radiol* 1999; **54**: 468–72.
2. Deitch EA, Soncrant MC. Ultrasonic diagnosis of surgical disease of the inguinal-femoral region. *Surg Gynecol Obstet* 1981; **152**: 319–22.
3. Shadbolt CL, Heinze SB, Dietrich RB. Imaging of groin masses: inguinal anatomy and pathological conditions revisited. *Radiographic* 2001; **21** (Suppl): S261–71.
4. Barile A, Erriquez D, Cacchio A, De Paulis F, Di Cesare E, Masciocchi C. Groin pain in athletes: role of magnetic resonance. *Radiol Med (Torino)* 2000; **100**: 216–22.
5. Van Den Berg JC, De Valois JC, Go PM, Rosenbusch G. Detection of groin hernia with physical examination, ultrasound and MRI compared with laparoscopic findings. *Invest Radiol* 1999; **34**: 739–43.
6. Orchard JW, Read JW, Neophyton J, Garlick D. Groin pain associated with ultrasound finding of inguinal canal posterior wall deficiency in Australian rules football. *Br J Sports Med* 1998; **32**: 134–9.
7. Babkova IV, Bozhko VV. Ultrasound assessment of uncomplicated inguinal hernia. *Khirurgiia (Mosk)* 1999; (2): 46–50.
8. Lawrenz K, Hollman AS, Carachi R, Cacciaguerra S. Ultrasound assessment of the contralateral groin in infants with unilateral inguinal hernia. *Clin Radiol* 1994; **49**: 546–8.