CASE REPORT

The disappearing clip: an unusual complication in MRI biopsy

Anita Geraldine Bourke,¹ Prasant Peter,¹ Chaitra Lesli Jose²

¹Department of Radiology,
Sir Charles Gairdner Hospital,
Perth, Western Australia,
Australia

²Sir Charles Gairdner Hospital,
Perth, Western Australia,
Australia

Correspondence to

Dr Anita Geraldine Bourke,
anita.bourke@health.wa.gov.au

Accepted 28 July 2014

SUMMARY

MRI-guided biopsies are being increasingly used for otherwise occult breast lesions. Clip migration has been reported however, to the best of our knowledge, there have been no documented cases of entire disappearance of a marker clip. Absence of the postbiopsy marker clip was noted when our patient returned for preoperative hook-wire localisation even though accurate clip placement had been confirmed on the post-MRI biopsy mammogram.

BACKGROUND

Core biopsy under ultrasound and stereotaxis, with clip placement at the site, is the established work-up of suspicious lesions in the breast. MRI-guided biopsy and clip placement for breast lesions which are otherwise occult is increasing. Absence of the postbiopsy marker clip was noted when our patient returned for preoperative hook-wire localisation even though accurate clip placement had been confirmed on the post-MRI biopsy mammogram. Reports of clip migration from the site of deployment after image-guided biopsies have been published. However, to the best of our knowledge, this is the first time absence of post-MRI biopsy clip is reported.

CASE PRESENTATION

A 37-year-old woman with a family history of breast cancer presented to the breast clinic with 1 month history of spontaneous bloody discharge from the right nipple. Clinical examination was normal. Minimal fluid was expressed from a single right duct, the cytology of which showed proteinaceous debris.

INVESTIGATIONS

Mammogram showed bilateral dense breasts with no masses, distortion or microcalcifications (figure 1A, B). Ultrasound demonstrated mild duct ectasia with no intraductal lesion. The patient was initially managed conservatively.

In view of her persisting symptoms (>1 year), dense breasts and risk profile, MRI was deemed prudent and demonstrated a linear 5 mm enhancing lesion at 12 o'clock location in the right breast (figure 1C), with dilated periareolar ducts. Dynamic enhancement features for the lesion were indeterminate. The lesion remained occult on targeted ultrasound. A vacuum-assisted (9-gauge 9 G; Suros) MRI (1.5 T Siemens)-guided biopsy was performed (figure 1D). Postbiopsy mammogram confirmed placement of the biopsy marker clip (figure 1E, F).

Histopathology confirmed benign tissue with fibrous changes.

TREATMENT

At follow-up, the 'high volume nipple discharge' persisted. The patient was distressed by her symptoms and was booked for central duct excision with pre-operative hook-wire localisation of the MRI biopsy site. However, on the morning of surgery, the post-MRI biopsy clip could not be located on stereotaxis. Repeat mammogram (figure 2A, B) as well as chest radiograph confirmed absence of the clip. Fortunately, ultrasound demonstrated an ill-defined hypoechoic abnormality in the area of biopsy, likely postprocedural scarring, which allowed hook-wire localisation (figure 2C, D). Post hook-wire mammograms were compared to the MRI target lesion and post-MRI biopsy mammogram, confirming accurate localisation (figure 2E–H).

OUTCOME AND FOLLOW-UP

Histopathology of the excised specimen demonstrated pseudoangiomatous stromal hyperplasia with sclerosing adenosis and benign ectatic ducts. Follow-up clinical evaluation as well as MRI was unremarkable. The clip could not be identified on any of the subsequent imaging and an incident report was filed.

DISCUSSION

MRI-guided procedures are appropriate for MR detected lesions that are occult on mammography and ultrasound.^{1 2} Detection rate of MRI for mammographically occult lesion in high-risk participants have been reported to be between 2–8%³ with diagnosis of additional lesions in ipsilateral breast reported to vary from 6–34%⁴ and incidental diagnosis of contralateral breast malignancy in 4–24%.⁵ MRI-guided core biopsy allows preoperative diagnosis which may avoid unnecessary excision and allow accurate clip placement for future localisation. Vacuum-assisted biopsy has the advantages of larger volumes of sampled tissue.

Limitations of MRI-guided procedures are cost, time, lack of equipment and expertise. Disadvantages of the procedure include need for MRI compatible biopsy devices and limited approach to posterior lesions. Reported problems associated with MR-guided biopsy include 'Vanishing target' (the reduction in contrast enhancement and lesion visibility) with increase in procedure time, artefacts from the biopsy gun and difficulties in clip placement.² Vacuum-assisted biopsies have been reported as a suitable alternative to MRI-guided wire localisations

CrossMark

To cite: Bourke AG, Peter P, Jose CL. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2014-204092

Figure 1 (A and B) Screening mammograms (mediolateraloblique, MLO and craniocaudal, CC views) show no suspicious mass lesion, distortion or microcalcification. (C) Post contrast MRI (90 s) image showing suspicious focal linear enhancement (long arrow). The lesion was sonographically occult and the patient therefore proceeded to MRI-guided biopsy. (D) MRI-guided biopsy performed for the enhancing lesion using 9 G needle and vacuum assistance. (E and F) Post-MRI biopsy check mammograms (MLO and CC view) confirm MRI clip (short arrow) at the site of biopsy with adjacent haematoma.

of occult lesions.⁶ Studies comparing 14 G MRI compatible core needle biopsy with vacuum-assisted large gauge (9 G) biopsies confirmed reduced need for additional contrast usage for lesion demarcation, reduced introducer artefact and more accurate clip placement.⁷

Clip placement is important for accurate marking and localisation following the removal of the entire lesion during

biopsy. Targeting the clip, using mammographic or ultrasound guidance at subsequent preoperative wire insertion, enables precise localisation. Recent studies from France and Quebec conclude that majority of breast radiologists prefer to leave a marker clip following mammographic or MRI-guided biopsies.⁸ However, the practice is less common following ultrasound-guided biopsies.⁸

Figure 2 (A and B) Check mammogram following failure to locate the MRI clip for hook-wire localisation on the day of surgery confirms absence of the clip. (C and D) Ultrasound demonstrates scarring at the site of previous MRI biopsy. This site was targeted for hook-wire localisation. (E–H) Post hook-wire mammograms (F and H) with the corresponding post-MRI biopsy images (E and G) placed alongside to confirm hook-wire location at the site of the previous lesion. The arrow in (E) and (G) demonstrates the clip in the post-MRI biopsy images and that in images (F) and (H) demonstrates the skin marker at the site of hook-wire insertion.

Migration of clip following vacuum-assisted stereotactic-guided biopsy and clip placement has been documented⁹ and is an accepted risk of the procedure. Complete disappearance of the clip following stereotactic biopsy is unusual and has been reported only once so far.¹⁰ To the best of our knowledge, there has been only one case reported so far where a clip appeared to be deployed following MRI-guided biopsy but could not be located on immediate follow-up mammography and MRI.⁶ On the other hand, in our patient, accurate clip deployment was confirmed on immediate postbiopsy mammograms.

Migration of marker clips have been divided into immediate or delayed. Immediate displacement is easily identified and may be related to the accordion effect which is secondary to release of compression of breast tissue, commonly with stereotaxis. The accordion effect is usually along the z axis and so can be best identified in an orthogonal plane to the one used for compression. A 'delayed accordion effect' has also been proposed as a cause for migration of a perfectly positioned clip at the time of follow-up mammograms.

A number of other mechanisms have been proposed to explain the migration of a clip which was accurately positioned in the postbiopsy mammogram on follow-up scans. These include displacement along the track of the biopsy needle, fatty parenchyma, haematoma formation, air resorption within the biopsy site, displacement by a second clip and displacement following surgery or chemotherapy.¹¹ Haematoma formation and displacement following air resorption likely applies to MRI biopsies as well. Displacement of the clip along the biopsy track is usually secondary to oozing from the site of biopsy and can theoretically lead to extrusion from the incision site. Haematoma formation prevents tissue adhesion of the clip and may result in the clip either floating within the blood or getting displaced by mass effect. The chance of migration increases with size of the biopsy cavity. In our patient, the complete disappearance of the clip on all subsequent imaging including chest radiographs is difficult to explain. A possibility is the migration of clip into one of the ectatic ducts seen on mammogram post-MR biopsy and then expulsion along with the profuse, 'high velocity' nipple discharge. However, there was no history to suggest clip extrusion. The obvious disadvantage of clip migration is the failure of accurate localisation of the remnant lesion at the time of surgery. Hence careful attention must be given to confirm accurate positioning and documentation of the marker clip site at the time of biopsy.

In the rare event of complete clip disappearance, the only option, as in our case, is careful reassessment of the mammogram and ultrasound to identify any residual biopsy site changes in order to guide localisation. The surgeon must also be made aware of the lack of marker clip. We feel that this case clearly illustrates to the radiologist and surgeon, the possibility (albeit

rare) of clip disappearance from the breast and the need for informing the patient to this possibility during consent.

Learning points

- ▶ Be aware of the possibility of clip disappearance from the breast.
- ▶ Be aware of the need to inform the patient to this possibility during consent.
- ▶ Always take a postclip mammogram.
- ▶ Use ultrasound skills to identify the biopsy site for localisation.

Acknowledgements The authors thank Roslyn Knight and Natalie Webb for library assistance.

Contributors AGB led the paper preparation, was involved with the case, follow-up and made the decision to write the case report. PP and Jose contributed to the paper writing and to preparing the images and reading the literature to prepare the paper. There was intellectual input from all three authors.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Orel SG, Schnall MD, Newman RW, *et al.* MR imaging-guided localization and biopsy of breast lesions: initial experience. *Radiology* 1994;193:97–102.
- 2 Liberman L, Morris EA, Dershaw DD, *et al.* Fast MRI-guided vacuum-assisted breast biopsy: initial experience. *AJR Am J Roentgenol* 2003;181:1283–93.
- 3 Morris EA, Liberman L, Ballon DJ, *et al.* MRI of occult breast carcinoma in a high-risk population. *AJR Am J Roentgenol* 2003;181:619–26.
- 4 Liberman L, Morris EA, Dershaw DD, *et al.* MR imaging of the ipsilateral breast in women with percutaneously proven breast cancer. *AJR Am J Roentgenol* 2003;180:901–10.
- 5 Liberman L, Morris EA, Kim CM, *et al.* MR imaging findings in the contralateral breast of women with recently diagnosed breast cancer. *AJR Am J Roentgenol* 2003;180:333–41.
- 6 Orel SG, Rosen M, Mies C, *et al.* MR Imaging –guided 9-gauge vacuum-assisted core-needle breast biopsy: initial experience. *Radiology* 2006;238:54–61.
- 7 Kuhl CK, Morakkabati N, Leutner CC, *et al.* MR imaging—guided large-core (14-gauge) needle biopsy of small lesions visible at breast MR imaging alone. *Radiology* 2001;220:31–9.
- 8 Thomassin-Naggara I, Jalaguier-Coudray A, Chopier J, *et al.* Current opinion on clip placement after breast biopsy: a survey of practising radiologists in France and Quebec. *Clin Radiol* 2013;68:e378–83.
- 9 Birdwell RL, Jackman RJ. Clip or marker migration 5–10 weeks after stereotactic 11-gauge vacuum-assisted breast biopsy: report of two cases. *Radiology* 2003;229:541–4.
- 10 DiPiro PJ. Disappearance of a localizing clip placed after stereotactic core biopsy of the breast. *AJR Am J Roentgenol* 1999;173:1134.
- 11 Esserman LE, Cura MA, DaCosta D. Recognizing pitfalls in early and late migration of clip markers after imaging-guided directional vacuum-assisted biopsy. *Radiographics* 2004;24:147–56.

Copyright 2014 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow