Case Report

Radiological Appearance of Breast Augmentation with Injected Hydrophilic Polyacrylamide Gel

W. W. M. LAM*, W. C. W. CHU*, G. TSE†, F. W. P. LI

*Department of Diagnostic Radiology and Organ Imaging and †Department of Anatomical and Cellular Pathology, The Chinese University of Hong Kong, Shatin, New Territories, Hong Kong

INTRODUCTION

Injection augmentation mammoplasty with hydrophilic polyacrylamide gel (PAAG) has become very popular in China since 1997. It has been claimed by users to be a safe method with good cosmetic results. Aspiration is claimed to be an effective and convenient way for removal of the injected gel. We report the mammography, ultrasonography and magnetic resonance imaging (MRI) of two patients undergoing PAAG mammoplasty, one patient suffered complications from the procedure.

CASE REPORT

Case 1

A 25-year-old female underwent PAAG mammoplasty 13 months before presenting with mastalgia and breast lumps. Mammography showed a non-specific generalized increase in density of the whole breasts. No definite discrete mass was identified (Fig. 1a). Ultrasonography showed anechoic substance in the infraglandular location. It was relatively homogenous with echogenic foci within the substance. There was sharp delineation between glandular tissue and the injected gel. At the site of breast lumps and tenderness, there was a honeycomb-like anechoic region with an ill-defined border with the glandular tissue. Pockets of gel were noted within the glandular tissue. Migration of the injected gel to the infracavicular region was also identified (Fig. 1b).

MRI showed homogenous hyperintensity of the gel on T2-weighted images. It was hypointense on T1-weighted images. It was predominantly positioned infraglandularly. Corresponding to the site of tenderness and ultrasonographic honeycomb location, there was marked enhancement after administration of contrast medium and the border between the gel and the glandular tissue was ill defined (Fig. 1c–e).

Ultrasound-guided aspiration with a 16 G hypodermic needle of the honeycomb site yielded 2 ml yellowish gel-like substance. Tru cut biopsy under local anaesthesia was performed and fibrotic tissue was obtained.

Case 2

A 46-year-old lady presented with generalized breast discomfort 4 months after PAAG injections. No specific site of tenderness could be identified. Mammography showed a generalized increase in the density of the breast tissue with lobulate outline. Ultrasound showed a well-defined anechoic substance in the infraglandular layer. No honeycomb appearance was identified (Fig. 2a). MRI of the breast showed no abnormal enhancement (Fig. 2b).

DISCUSSION

Hydrophilic PAAG has been adopted for the plastic repair of soft tissue such as the lip. It is claimed to be non-toxic and to cause little fibrous capsule formation, and its application is predominantly reported in the Russian literature [1–3]. Its use in the anterior chamber of the eye has, however, been withdrawn because of the association of delayed sustained increase in intraocular pressure [4]. One animal study showed there was a local histological reaction and thin fibrous membrane formation around PAAG, which gradually became stiff. The shape and location of the injected PAAG was not stable and could not be drawn out completely [5].

There is little literature about the applications and complications of PAAG in breast augmentation, as it is not widely practised in Western countries. It was only introduced in China for breast augmentation in 1997, and so the long-term complications of the procedure cannot be fully evaluated. Cheng’s study reported 12 patients with complications after PAAG augmentation. Breast induration or lumps were found to be the most common complications [6]. Haematoma, inflammation, infection, mastalgia and laceration have also been reported. PAAG fillers can partially degrade and carcinogenic and mutagenic monomers can be released [7]. The long-term side effects have not been documented.

In the management of these patients, the clinical features and symptoms are obviously important. Radiological evaluation also has a role as revealed in our cases. The mammographic appearance is very non-specific, however,
ultrasonography is a very useful technique. It identifies the exact location of the injected PAAG and demonstrates the layer of tissue involved. From the sonographic appearance of our reported cases and correlation with clinical symptoms, it is suggested that ultrasound can be used to delineate the site of the complications. The honeycomb appearance might be related to a fibrotic reaction and local inflammation, causing mastalgia and lumps. Our clinical findings agree with the findings of the animal study [5]. In the absence of complications, the injected PAAG appears as a homogenous hypoechoic layer, as indicated by patient 2. MRI also shows the position of the injected gel. Contrast medium enhancement allows delineation of the complicated site. However, one cannot differentiate carcinoma from fibrotic reaction, and the ultimate diagnosis relies on histology. The accessibility of MRI will also limit its routine usage in the assessment of the patients.

Aspiration of the gel with a 16 G hypodermic needle has proved to be possible. Cheng reported the use of cannula suction procedure via a 3 mm-diameter cannula to remove PAAG [6]. Saline irrigation and massage is required to
soften the implanted gel. Ultrasound might then serve as a useful guide to monitor whether PAAG has been completely removed [6]. Open suction procedure, mammotomy and partial mastectomy may be required to treat different complications.

There is increasing use of injection mammoplasty with PAAG and it is important to be familiar with the radiological appearance of complicated and non-complicated cases. Ultrasoundography has shown to be useful in demonstrating the extent of involvement of complications.

REFERENCES


4 Herrington RG, Ball SF, Updegraff SA. Delayed sustained increase in intraocular pressure secondary to the use of polyacrylamide gel (Orcolon) in the anterior chamber. Ophthalmic Surg, 1993;24:658–662.


Fig. 2 – A 46-year-old lady with PAAG injection 4 months previously presented with generalized breast discomfort without specific site of tenderness. (a) Transverse sonogram shows a well-defined anechoic substance (white arrows) in the infraglandular layer. No honeycomb appearance evident. Underlying pectoralis muscle is indicated by black arrows. (b) T2-weighted (FOV: 32 cm, TR/TE: 2000/100, turbo factor of 18, NEX: 3) sagittal image of the breast shows the hyperintense gel (arrows) is infraglandular in location with clear demarcation from the overlying breast parenchyma.