

Challenges of Polyacrylamide Gel (PAAG) Breast Augmentation

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Introduction

The injectable breast filler Polyacrylamide hydrogel (PAAG) was widely used in China since the 1980s with as many as 300,000 women injected for cosmetic or for reconstruction purposes.¹ The procedure requires no anaesthesia and is often injected by non-medical professionals.

No safety clinical trials were conducted and in 2006 the Chinese State Food and Drug Administration prohibited the clinical application following significant evidence of neurotoxic and teratogenic monomers detected in the synthesis of PAAG.²

Although now withdrawn, many patients are developing on-going associated complications of PAAG and presenting worldwide to surgeons unfamiliar with the treatment, necessitating complex surgery. Management of PAAG is not standardised and often directed by the radiological appearances.

Case Report

A 50 year old female presented at one-stop clinic with a non-palpable lump in her left outer breast. Mammograms demonstrated appearances of bilateral subglandular implants (see fig.1). Ultrasound indicated a large non-encapsulated structure with internal echogenicity consistent with 'snowstorm' appearances (see fig.2) giving the impression of a ruptured implant with no lymphadenopathy.

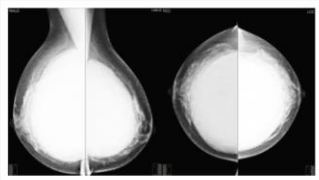


Figure 1: Mammogram: PAAG simulating silicone

Clinical history revealed no implants had ever been inserted, however PAAG had been injected in 1998 and so Magnetic Resonance Imaging (MRI) with contrast was undertaken to evaluate.

There was no evidence of an implant shell however an irregular nodular capsule was identified with a focal breach of filler extravasation in the left breast with re-encapsulation. Similar appearances also on the Right (see fig.3). As the patient was asymptomatic, a 6-month follow up scan was performed with no progression.

Discussion

A large case-series of 235 patients reported 72.5% with multiple complications.² Clinical presentation may include; lumps, infection, mastalgia, gel-migration, glandular atrophy and skin necrosis.^{2,3}

Clinical Imaging

PAAG increases the overall breast density mammographically, reducing the sensitivity. Sonographic appearances may simulate implant/silicone features and prove inconclusive. Inflammatory appearances may mask malignant changes.³

The osmotic self-expansion of PAAG can cause ductal occlusion and fibrosis. During lactation, gel mixing with milk may cause acute inflammation leading to infection.



Figure 2: Sonographic appearances of PAAG

PAAG contains 95-97.5% water, thus best depicted on turbo spin-echo, T2-weighted, non-fat suppressing sequence to evaluate the extent, whilst a dynamic contrast-enhanced T1 is useful for assessing inflammatory reaction shown by a rim of irregular nodular enhancement.⁴ Appearances correlate with our case but are similar to Breast Implant Associated - Anaplastic Large Cell Lymphoma (BIA-ALCL).⁵

Migration is common due to blind injection, and can be found in the retro pectoral, intrathoracic or extra pleural space, even extending into the abdominal wall. Nodal involvement is possible given migration.

References

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Surgical Management

This case reported deep infiltration of gel, with capsule formation and diffuse invasion throughout the pectoralis major muscle.

Literature recommends excision of as much as possible (often incomplete) to manage complications such as infection and poor cosmesis, with repeated antibiotic irrigation.³ Given that this patient had acceptable cosmetic appearances of both breasts with no evidence of infection or malignancy, the decision was made to not intervene due to the high risk of associated complications.

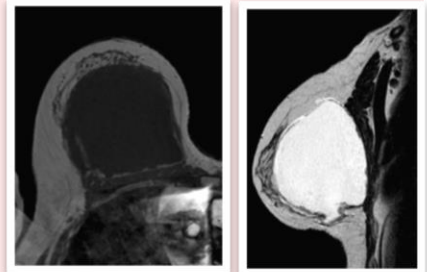


Figure 3: MRI of PAAG filler with nodular contrast enhancement and encapsulated gel migration

Recommendations

The following recommendations are taken from the literature and clinical experience;

- Full history prior to imaging
- Ultrasound features indeterminate
- MRI useful to determine extent/abscess
- Lactational complications common
- Consider follow up vs. surgical removal

Conclusion

The toxicity potential of PAAG is raising concern of the possible delay of breast cancer diagnosis. Symptomatic presentation of inflammatory change may mask malignancy, whilst diagnostic difficulties are providing challenges.

Radiologically, MRI is recommended to evaluate the extent, aiding surgery. Encapsulation, glandular atrophy and fibrosis are common. The infiltrating nature of PAAG poses significant issues in removal. Long term implications of PAAG are unknown and therefore excision is widely acknowledged, however with complications, often requiring debridement procedures and reconstruction.