

Case report

Open Access

Capsular contraction following immediate reconstructive surgery for breast cancer – An association with methylene blue dye

Gurpreet Singh-Ranger* and Kefah Mokbel

Address: Breast Surgery Unit St. George's Hospital and Medical School, London, England, UK

Email: Gurpreet Singh-Ranger* - gsinghranger@yahoo.co.uk; Kefah Mokbel - kefahmokbel@hotmail.com

* Corresponding author

Published: 11 May 2004

Received: 22 January 2004

International Seminars in Surgical Oncology 2004, 1:3

Accepted: 11 May 2004

This article is available from: <http://www.issoonline.com/content/1/1/3>

© 2004 Singh-Ranger and Mokbel; licensee BioMed Central Ltd. This is an Open Access article: verbatim copying and redistribution of this article are permitted in all media for any purpose, provided this notice is preserved along with the article's original URL.

Abstract

Capsular contraction following implantation of breast prostheses occurs in 2–33% of patients undergoing breast augmentation. This condition can be debilitating for patients, and often requires revisional surgery. The aetiology of capsular contraction is unclear, but may be due to infection, haematoma or foreign body-type reactions.

Methylene blue dye is a substance known to cause localised tissue inflammation, and is often used during breast cancer surgery to allow identification of the sentinel lymph node. We report a case of Baker Grade 4 capsular contraction necessitating revisional surgery, occurring in a patient who underwent immediate breast reconstruction during surgery for breast cancer. Methylene blue dye was used to locate the sentinel nodes during the original surgery, and was found to have heavily discoloured the prosthesis at subsequent revisional surgery. Capsular contraction may have been caused in part by a localised tissue reaction initiated by, or involving the dye.

Introduction

Immediate breast reconstruction during surgery for breast cancer is gaining in popularity. An implantable tissue expander is often used during the procedure. A late complication with the implantation of breast prostheses, especially those filled with silicone, is the onset of fibrous capsular contraction [1,2]. This can be debilitating for patients, and often necessitates revisional surgery. Whilst the aetiology of capsular contraction is unclear, its pathogenesis clearly involves a localised tissue reaction [3,4].

We report a case of severe capsular contraction in association with intense methylene blue dye staining of a saline-filled prosthesis. This occurred following immediate reconstructive surgery for breast cancer, in which methyl-

ene blue dye was used to identify the sentinel lymph node. The known tissue reactive properties of methylene blue dye [4-6] suggest that it may have been implicated in the pathogenesis of the fibrous contracture.

Case Report

A 58-year-old woman presented to the Breast Unit with a 1.7 cm-sized screen-detected carcinoma of the left breast, located lateral to the nipple. After confirmation of the diagnosis by fine-needle aspiration cytology (FNAC), the patient underwent immediate breast reconstructive surgery.

Subdermal periareolar injection of 1.5 ml of 1 percent methylene blue dye was performed five minutes prior to

definitive surgery, to facilitate identification of the sentinel lymph node. Two blue lymph nodes were subsequently found during the course of axillary dissection, and removed. A skin-sparing mastectomy and immediate reconstruction were then performed, using a Becker™ saline-filled tissue expander implant.

The postoperative course was uneventful, and the patient was discharged from hospital after 4 days.

Seven days after surgery, the patient returned to the Breast Unit with a seroma surrounding the prosthesis. This was aspirated twice under ultrasound guidance, revealing serous fluid content only. An ultrasound scan at eight

weeks showed the fluid collection had completely resolved.

Nine months later, the patient developed a Baker Grade 4 capsular contracture [7], and consented for revisional surgery.

At surgery, a thick fibrous inflammatory capsule was found surrounding the implant, and on removal the prosthesis was noted to have an intense blue discoloration (Figure 1).

The patient was discharged five days after surgery, and was well at last follow-up.

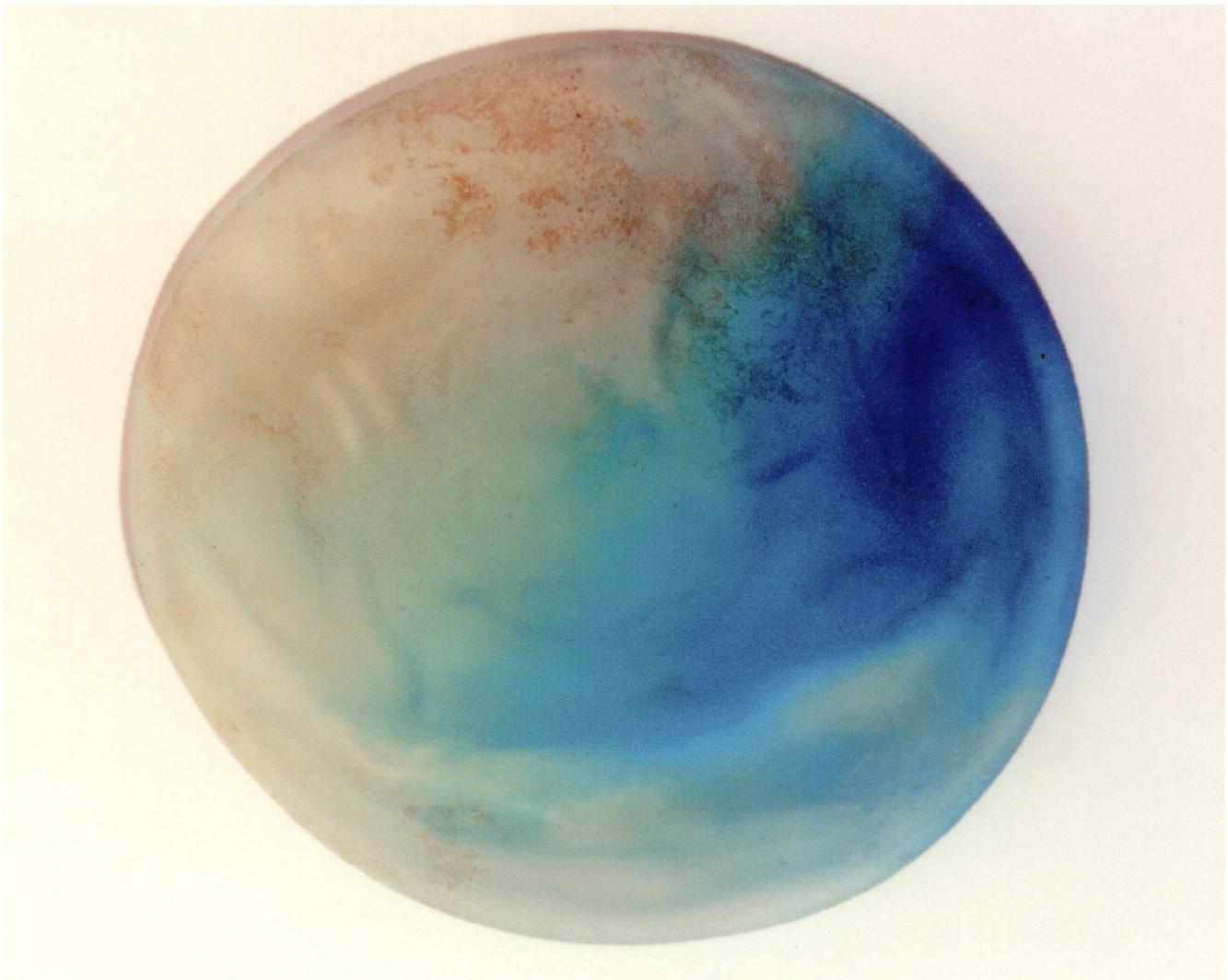


Figure 1

Conclusion

Methylene blue dye is used in a variety of operative procedures, including breast surgery, to allow delineation of anatomical structures [4,8,9].

Use of the dye however, has been associated with a number of local and systemic complications. These include localised eruptions and rashes [4,6], subcutaneous tissue necrosis and abscess formation [8], methaemoglobinaemia [10], and anaphylaxis [11].

The tissue reaction to methylene blue dye is a foreign body – type reaction characterised by eosinophilic infiltration, fibrinoid necrosis with ischaemic ulceration [4].

Fibrous capsule formation occurs around any implanted device as part of normal healing. After implantation of a breast prosthesis this process can lead to deleterious clinical changes, ranging from imperceptible deformation of the implant, to significant distortion and firmness [7]. The latter changes are often accompanied by tenderness and discomfort for the patient, necessitating revisional surgery. Recent studies have estimated an incidence of between 2% to 33% of capsular contraction in patients undergoing breast augmentation with various types of prosthesis [1,2]. The precise aetiology of capsular contraction is unclear, but may be related to factors such as infection, excessive bleeding at the time of surgery, or foreign body reactions [3].

Although subareolar intradermal injection of methylene blue dye to aid sentinel node localisation is described as a generally safe procedure [12], acute adverse events caused by the dye during breast surgery have been reported [11,13].

In this patient, a Grade 4 capsular contracture occurred some time after surgery in the presence of an implant intensely discoloured by the blue dye.

Whilst absolute causality cannot be proven, the presence of inflammation around the implant, together with the known tissue-reactive properties of methylene blue dye suggest that this substance may have been involved in a local tissue reaction which facilitated the development of the condition.

Use of methylene blue dye to localise sentinel nodes during immediate breast reconstructive surgery must therefore be considered as a factor which may increase the risk of subsequent capsular contraction.

References

1. Cairns TS, de Villiers W: **Capsular contracture after breast augmentation – a comparison between gel- and saline-filled prostheses.** *S Afr Med J* 1980, **57**:951-953.

2. Tarpila E, Ghassemifar R, Fagrell D, Berggren A: **Capsular contracture with textured versus smooth saline-filled implants for breast augmentation: a prospective clinical study.** *Plast Reconstr Surg* 1997, **99**:1934-1939.
3. Burkhardt BR, Dempsey PD, Schnur PL, Tofield JJ: **Capsular contracture: a prospective study of the effect of local antibacterial agents.** *Plast Reconstr Surg* 1986, **77**:919-932.
4. Lane KL, Vallera R, Washington K, Gottfried MR: **Endoscopic tattoo agents in the colon. Tissue responses and clinical implications.** *Am J Surg Pathol* 1996, **20**:1266-1270.
5. Perry PM, Meinhard E: **Necrotic subcutaneous abscesses following injections of methylene blue.** *Br J Clin Pract* 1974, **28**:289-291.
6. Raimer SS, Quevedo EM, Johnston RV: **Dye rashes.** *Cutis* 1999, **63**:103-106.
7. Little G, Baker JL Jr: **Results of closed compression capsulotomy for treatment of contracted breast implant capsules.** *Plast Reconstr Surg* 1980, **65**:30-33.
8. Borgstein PJ, Meijer S, Pijpers R: **Intradermal blue dye to identify the sentinel lymph node in breast cancer.** *Lancet* 1997, **349**:1668-1669.
9. Simmons RM, Smith SM, Osborne MP: **Methylene blue dye as an alternative to isosulfan blue dye for sentinel lymph node localisation.** *Breast J* 2001, **7**:181-183.
10. Whitwam JG, Taylor AR, White JM: **Potential hazard of methylene blue.** *Anaesthesia* 1979, **34**:181-182.
11. Mostafa A, Carpenter R: **Anaphylaxis to patent blue dye during sentinel lymph node biopsy for breast cancer.** *Eur J Surg Oncol* 2001, **27**:610.
12. Klimberg VS, Rubio IT, Henry R, et al.: **Subareolar versus peritumoral injection for localisation of the sentinel lymph node.** *Ann Surg* 1999:860-864.
13. Woltsche-Kahr I, Komericki P, Kranke B, et al.: **Anaphylactic shock following peritumoral injection of patent blue dye in sentinel lymph node biopsy procedure.** *Eur J Surg Oncol* 2000, **26**:313-314.

Publish with **BioMed Central** and every scientist can read your work free of charge

"BioMed Central will be the most significant development for disseminating the results of biomedical research in our lifetime."

Sir Paul Nurse, Cancer Research UK

Your research papers will be:

- available free of charge to the entire biomedical community
- peer reviewed and published immediately upon acceptance
- cited in PubMed and archived on PubMed Central
- yours — you keep the copyright

Submit your manuscript here:
http://www.biomedcentral.com/info/publishing_adv.asp

