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# Diagnostic fine-needle aspiration in postoperative wound infections is more accurate at predicting causative organisms than wound swabs

**AR PARIKH, S HAMILTON, V SIVARAJAN, S WITHEY, PEM BUTLER**

Department of Plastic Surgery, Royal Free Hampstead NHS Trust, Hampstead, London, UK

ABSTRACT

INTRODUCTION Postoperative wound infections are common. Antibiotics are often prescribed empirically, usually in the absence of any microbiological sensitivity data. This study demonstrates the role of fine-needle aspiration microbiology (FNAM) in determining the causative organisms in these wounds compared to wound swabs taken from the same patients.

PATIENTS AND METHODS A total of 20 patients with clinical signs of soft tissue infection were tested using wound swabs and fine-needle aspiration.

RESULTS Six of the wound swabs yielded a single organism but 16 out 20 of the FNAM group yielded a single organism ($P = 0.002$).

CONCLUSIONS The FNAM approach allows antibiotic sensitivities to be obtained enabling specific antimicrobial therapy to be implemented early. FNAM also has a higher yield of cultures than wound swabs. Cellulitic areas can be sampled even when use of wound swabs is not possible.

KEYWORDS

Infection – Wound swab – Fine-needle aspiration – FNAM

CORRESPONDENCE TO

**Apul R Parikh,** Research Registrar, Department of Plastic Surgery, Royal Free Hampstead NHS Trust, Pond Street, Hampstead, London NW3 2QG, UK

T: +44 (0)20 7794 0500 ext 4340; M: +44 (0)7917 785777; Fax: +44 (0)20 7472 6557; E: apulparikh@yahoo.com

All surgical specialities deal with postoperative wound infections on a regular basis. These can often be simple cases of cellulitis that resolve within a few days with regular antimicrobial agents. Wound swabs are not feasible in closed wounds and may carry surface contaminants in open wounds. However, antibiotics are usually commenced blindly without having the microbiological sensitivity data. We aimed to obtain these using fine-needle aspirations and then combat the infection with the appropriate agent. FNAM has previously been used for diagnosis of various conditions, including tuberculosis,[2] tonsillitis,[3] and acute as well as chronic soft tissue infections.[4] It has not, to our knowledge, been used in a study comparing its efficacy to wound swabs at predicting causative organisms in patients who had recently undergone elective surgery.

## Patients and Methods

Hospital ethical approval was obtained prior to commencing our study. A total of 20 patients with clinical signs of soft tissue infection were used in the study. These patients had undergone clean, elective surgical procedures. The procedures included bilateral breast reductions and abdominoplasties. Their ages ranged from 23–67 years. None of the patients had any significant co-morbidity and none were receiving antimicrobials at the time of fine-needle aspiration.

Wound swabs were taken from each patient. The suspected areas were then disinfected using chlorhexidine gluconate and allowed to dry for 60 s. A 10-ml syringe and a 21-G needle were used to obtain the aspiration biopsy. The fine-needle aspiration was performed by introducing the needle in the suspected area and briskly withdrawing the plunger. The contents were then transferred onto a wound swab and analysed in our microbiology laboratory using standard techniques. Local anaesthetic was not used as it has been reported that local anaesthetic can have antimicrobial effects.[5]

## Results

The results showed that 6 of the wound swabs yielded a single organism. Four of the wound swabs yielded mixed growth of doubtful significance, whilst the remainder of the

**Table 1 Bacteria isolated**

| Patient number | Wound swab | Fine-needle aspirate |
|---|---|---|
| 1 | *Staphylococcus aureus* | *Staphylococcus aureus* |
| 2 | Nil growth | Nil growth |
| 3 | Nil growth | *Staphylococcus aureus* |
| 4 | Nil growth | Group F *Streptococcus* |
| 5 | Mixed growth | *Staphylococcus aureus* |
| 6 | *Staphylococcus aureus* | *Staphylococcus aureus* |
| 7 | *Staphylococcus aureus* | *Staphylococcus aureus* |
| 8 | Nil growth | *Escherichia coli* |
| 9 | Nil growth | *Staphylococcus aureus* |
| 10 | Nil growth | Nil growth |
| 11 | Nil growth | Nil growth |
| 12 | *Staphylococcus aureus* | *Staphylococcus aureus* |
| 13 | *Escherichia coli* | *Escherichia coli* |
| 14 | Nil growth | Nil growth |
| 15 | Nil growth | *Staphylococcus aureus* |
| 16 | Nil growth | *Staphylococcus aureus* |
| 17 | Mixed growth | *Escherichia coli* |
| 18 | *Staphylococcus aureus* | *Staphylococcus aureus* |
| 19 | Mixed growth | *Staphylococcus aureus* |
| 20 | Mixed growth | *Escherichia coli* |

swabs did not isolate any bacteria. Sixteen of the aspirates, however, yielded single organisms. The remaining four did not generate any bacterial growth. In each case where both wound swabs and wound aspiration revealed a single organism, the bacterium identified was the same. Our results suggest that wound aspiration has a lower false negative rate than taking wound swabs and is, therefore, more sensitive in identifying bacteria. Using a Wilcoxon signed rank test, this result was found to be highly statistically significant ($P = 0.002$). The main bacteria identified were *Staphylococcus aureus*, followed by *Escherichia coli* and Group F *Streptococci* (Table 1). Patients initially received empirical antibiotics and, if appropriate, antibiotic therapy was modified once sensitivities were obtained.

## Discussion

Clinically, fine-needle aspiration biopsy is not used on a regular basis for the diagnosis of infective organisms. Our study demonstrated FNAM to be highly clinically relevant. Although we had a limited sample size, our results demonstrate that FNAM has significantly higher yield of relevant bacterial cultures compared to wound swabs.

From this study, one can envisage a number of circumstances where FNAM may aid the clinical management of patients with suspected soft tissue infections. First, in open infected wounds, as our data show, simple wound swabs often yield mixed cultures of uncertain significance and, when these mixed cultures are obtained, antibiotic choice is less certain and combination therapy covering all the cultured bacteria may be required. This increased antibiotic use, of course, comes with the risk of added idiopathic morbidity. FNAM, on the other hand, is likely to identify the single causative organism involved.

Second, a more difficult clinical situation exists in the context of a closed, inflamed surgical wound or a cellulitic area in the absence of a wound. Here, a simple swab of the skin or wound surface (though often done in the clinical setting) is unlikely to identify the specific infective organism. FNAM gives the opportunity to isolate specific organisms from the inflamed tissue itself, allowing targeted antimicrobial therapy to be employed as soon as the result is available. This is especially important in the current era of multidrug-resistant organisms where the first choice of empirical antibiotic may turn out to have been erroneous.

Third, procedures such as abdominoplasty and breast reduction can, from time to time, be associated with varying degrees of non-infective fat necrosis. This can sometimes result in a clinical picture not dissimilar to subcutaneous infection and obtaining a negative FNAM in these circumstances may help to confirm the clinical diagnosis of fat necrosis (where antibiotics may be unnecessary).

These three scenarios are seen frequently in busy clinical practice and FNAM has advantages in each case. FNAM is quick and simple to perform in the office setting. It is relatively pain-free, cost-effective and uses standard microbiological laboratory techniques available to most clinicians. We recommend this technique be considered as a first-line investigation in infected wounds and cellulitic areas.

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