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Citation for published version:

Digital Object Identifier (DOI):
10.1177/1098612X12439269

Link:
Link to publication record in Edinburgh Research Explorer

Document Version:
Publisher's PDF, also known as Version of record

Published in:
Journal of Feline Medicine and Surgery

Publisher Rights Statement:
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Nanocrystalline silver dressing and subatmospheric pressure therapy following neoadjuvant radiation therapy and surgical excision of a feline injection site sarcoma

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DOI: 10.1177/1098612X12439269

The online version of this article can be found at:
http://jfm.sagepub.com/content/14/3/214

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Clinical summary  This is the first clinical report of use of a combination of nanocrystalline silver and subatmospheric pressure therapy to treat a resistant wound infection, following tumour removal and radiation therapy, in a difficult-to-manage surgical site in a cat.

Practical relevance  The therapy was well tolerated and the authors suggest it is a valid treatment protocol for management of non-healing or infected wounds in the cat.

Clinical report

A 9-year-old, neutered female, domestic short-haired cat was presented to the Hospital for Small Animals, R(D)SVS, University of Edinburgh for management of a suspected feline injection site sarcoma (FISS). The mass had been noted 1 month after annual vaccination with a non-adjuvanted vaccine against feline viral rhinotracheitis (modified live), calicivirus (inactivated), infectious panleukopenia (modified live) and feline leukaemia virus (FeLV) (recombinant).

Referral findings and investigations

A non-painful, firm, irregular, cystic mass, of approximately 8 cm diameter, was located in the interscapular region. The mass was covered by normal skin and was broadly attached to the underlying musculature (Figure 1).

Serum biochemistry, total T4 and haematology revealed no significant changes. Feline immunodeficiency virus (FIV) antibody and FeLV antigen Snap test (Idexx) were negative. Computed tomography revealed the mass to be arising from the junction of the latissimus dorsi, trapezius and cutaneous trunci muscles, abutting the scapulae, thoracic dorsal spinous processes and the interscapular and epaxial muscles. Small contrast-enhancing tendrils extended caudally to the level of T12. Staging according to the World Health Organization was T3, M0, NX.

Tumour therapy

Neoadjuvant external beam radiation therapy was combined with aggressive surgical excision. Radiotherapy to the tumour and surrounding tissue consisted of 15 fractions of 3.2 Gy, Monday to Friday, for 3 weeks, using a single direct electron field at 9 MeV (Varian Linac linear accelerator) with the cat under general anaesthesia. The only overt acute radiation effect was patchy hair loss in the treatment field. As expected, no change in the size of the mass was noted post-radiation.

Four weeks after radiation therapy, wide local excision was performed, removing the dorsal margin of the right scapula, the nuchal
ligament, the dorsal spinous processes and the epaxial musculature directly underneath the mass. Primary closure was achieved using a combination of undermining, layered wound reconstruction, tension-relieving walking sutures, anchorage of soft tissue to the bones at the periphery of the resection and placement of a closed suction drain (Figure 2). The wound was reconstructed without obvious tension along the suture lines. The drain was removed after 2 days and the cat recovered uneventfully.

Fourteen days after surgery a central area of dehiscence was noted. Necrotic tissues were debrided, the area was lavaged and tension-free closure was again performed. One week later wound dehiscence recurred at the same site. Histopathology of the wound bed identified no residual disease or early tumour recurrence. The wound was debrided and closed using a stented horizontal mattress pattern to appose the skin following reconstruction of the deeper tissues. Five days later, discharge from the central portion of the wound was noted and a highly resistant *Enterococcus* species was cultured. Antimicrobial testing identified no effective drugs for systemic use. Instead, a high topical concentration of gentamicin sulphate (Genticin; Am shipharm) was applied, using paraffin-impregnated gauze dressings, and amoxicillin/clavulanate (Synulox; Pfizer) was administered systemically for synergistic effect.

Despite therapy, the infection continued and a large, open wound developed with underrunning over both scapulae (Figure 3).

**Wound therapy**

Progressive wound dehiscence, resistant bacterial infection and difficulty in applying topical therapy prompted the use of subatmospheric pressure therapy (SAPT). Under general anaesthesia the wound bed was sharply debrided and irrigated. A flexible, conforming, nanocrystalline silver dressing (Acticoat Flex 3; Smith & Nephew) was applied to the wound bed over the next 17 days and either gauze swabs or foam were used to maintain contact with the wound surface. An occlusive film dressing (Opsite; Smith & Nephew) was secured with stoma paste (Coloplast; Coloplast A/S) to provide an air-tight seal. A vacuum port was applied to the dressing and attached to a subatmospheric pressure wound pump (Vista; Smith & Nephew) (Figure 4). The pressure was initially set to a continuous suction of -50 mmHg and subsequent-
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Nanocrystalline silver dressings are conformable and flexible, and can be changed on a 3- to 7-day basis without causing maceration to the wound bed. They are also active against resistant organisms, including MRSA and *Pseudomonas* species.

Earlier reports expressed concerns over the use of SAPT at tumour excision sites, as increased local blood flow associated with SAPT might stimulate cancer cell proliferation within the wound bed. However, it has been used successfully for the management of wound dehiscence at tumour excision sites in people, including following soft tissue sarcoma removal.

**Conclusion**

This is the first report in the veterinary literature of the use of SAPT for the management of wound dehiscence following radiotherapy and tumour excision, and the first report of its use in combination with nanocrystalline silver dressings in a cat. The combination allows both direct bacterial cell kill through the use of the silver contact layer and direct effects on wound contraction and healing through an increased blood supply, removal of oedema and exudates, and enhancement of granulation tissue. SAPT was highly effective at maintaining contact between the dressing materials and wound in this case, and the authors believe that this contributed directly to resolution of infection. Moreover, SAPT contributed to closure of dead space, promotion of granulation tissue and contraction of the wound, facilitating subsequent closure.

**Acknowledgements**

The authors would like to acknowledge Mr Colm Farrell (referring veterinarian surgeon), and Dr Sionagh Smith, Karen Perry, John Ryan and all members of the R(D)SVS Division of Veterinary Clinical Sciences for their assistance in this work, especially the anaesthesia and nursing teams. They also thank Hilary Gossman and Lynsey Dey, of Smith & Nephew, for advice and assistance using the SAPT and nanocrystalline silver dressings.

**Funding**

The authors received no specific grant from any funding agency in the public, commercial or not-for-profit sectors for the preparation of this case report.

**Conflict of interest**

The authors declare that there is no conflict of interest.
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