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

Citation for published version:
https://doi.org/10.1177/1098612X12439269

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:
© ISFM and AAFP 2012

General rights
Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy
The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact openaccess@ed.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.
Nanocrystalline silver dressing and subatmospheric pressure therapy following neoadjuvant radiation therapy and surgical excision of a feline injection site sarcoma
Samantha Woods, Ana I de Castro Marques, Mala G Renwick, Sally A Argyle and Donald A Yool

DOI: 10.1177/1098612X12439269

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

Disclaimer

The Journal of Feline Medicine and Surgery is an international journal and authors may discuss products and formulations that are not available or licensed in the individual reader’s own country. Furthermore, drugs may be mentioned that are licensed for human use, and not for veterinary use. Readers need to bear this in mind and be aware of the prescribing laws pertaining to their own country. Likewise, in relation to advertising material, it is the responsibility of the reader to check that the product is authorised for use in their own country. The authors, editors, owners and publishers do not accept any responsibility for any loss or damage arising from actions or decisions based on information contained in this publication; ultimate responsibility for the treatment of animals and interpretation of published materials lies with the veterinary practitioner. The opinions expressed are those of the authors and the inclusion in this publication of material relating to a particular product, method or technique does not amount to an endorsement of its value or quality, or the claims made by its manufacturer.
**Clinical report**

A 9-year-old, neutered female, domestic short-hair 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 (Genticon; Amdipharm) 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-
ly decreased in increments to −120 mmHg over the next 48 h. Analgesia was provided with parenteral buprenorphine (Vetergesic; Alstoe Animal Health) and oral meloxicam (Metacam; Boehringer Ingelheim). Antibiotic therapy was continued with amoxicillin/clavulanate.

Dressing changes were performed every 48–72 h with the patient anaesthetised. There was marked improvement in the wound bed, which contracted and developed a healthy layer of granulation tissue. Subsequently, the wound was dressed using an open-cell foam in direct contact with the wound.

Forty days after initiation of SAPT the wound pump was removed. The wound bed appeared healthy and had reduced in size to 30% of the original surface area. The underrun pocket over the right scapula had largely closed (Figure 5). Small numbers of *Enterococcus* species were isolated in pure growth from swabs taken from the surface of the wound, although there was no indication of active infection. Courses of cefalexin (Cephacare; Animalcare) and clindamycin (Antirobe; Pfizer) were initiated. Staggered wound closure was achieved by two proce-

---

**Histopathology report**

The mass consisted of a non-encapsulated proliferation of spindle cells effacing the subcutis. They were arranged in interlacing streams and short palisading fascicles, supported by an abundant collagenous matrix which was often sclerotic or arranged in a trabecular pattern between the spindle cells. Individual cells had indistinct cell borders, extensive projections of eosinophilic cytoplasm and oval to elongated, faintly stippled, hypochromatic nuclei. They often contained multiple nucleoli. There was moderate to marked anisokaryosis and mitotic figures averaged 2–3 per high power field (400 x), with occasional abnormal mitotic spindles. There were multifocal areas of necrosis and tissue cavitation within.

---

**Discussion**

Management of FISS is difficult and early local recurrence is common, even after extensive resection. Multimodal therapy is recommended because of the invasive nature of this tumour. Improved disease-free intervals have been reported in cats when surgery has been combined with adjuvant radiotherapy.\(^1\)\(^\text{-}^3\) In humans, local recurrence rates are also significantly reduced in patients receiving adjuvant or neoadjuvant radiation in combination with surgery, although complication rates are higher with neoadjuvant radiation.\(^4\)\(^\text{-}^6\) Neo-adjuvant radiation aims to destroy microscopic disease at the periphery of the tumour before surgery is performed to reduce the recurrence of tumour at the margins of resection.\(^7\) It has advantages over adjuvant radiotherapy in that a smaller field is irradiated and the tissues are well vascularised and oxygenated at the time of irradiation, which improves the efficacy of radiotherapy. Wound complications following tumour removal and irradiation are common,\(^8\)\(^\text{-}^9\) prompting the recommendation to separate treatment...
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 veterinary 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 with 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.
References


Available online at jfms.com
Reprints and permission: sagepub.co.uk/journalsPermissions.nav