

Chapter 1: Surgical Resection of Cutaneous and Subcutaneous Tumors

There are two basic surgical approaches for tumor resection: marginal and wide surgical resection. With a wide surgical resection, a certain width of normal tissue is resected lateral and deep to the tumor to account for microscopic extension from the tumor. There are two proposed margin systems: metric and proportional. The metric width of normal tissue depends on the tumor type and varies from 1 cm for benign tumors and malignant carcinomas to 2 cm for mast cell tumors and soft tissue sarcomas and up to 5 cm for vaccine-associated sarcomas in cats. Alternatively, when using the proportional margin system, the width of the lateral margins is equal to the maximum dimension of the tumor. Note that both the metric [1] and proportional margin systems [2] have been validated for only a subset of cutaneous mast cell tumors in dogs, and all other margin recommendations are based on anecdotal evidence. For both margin systems, the deep margin includes an anatomic barrier, an uninvolved fascial layer, rather than a metric measurement.

The advantage of wide surgical resection is that risk of local tumor recurrence is significantly decreased. Although the majority of wounds after wide surgical resection can be closed primarily, occasionally they cannot. If the wound cannot be closed, then the wound can be managed with second intention healing (see 46. *Second Intention Healing*), random subdermal or axial pattern flaps (see 39. *Advancement Flap*, 40. *Rotation Flap*, 41. *Transposition Flap*, 42. *Flank Fold Flaps*, 43. *Axial Pattern Flaps*, and 44. *Distant Indirect Flap*), or free-meshed skin grafts (see 45. *Skin Grafts*). Although these reconstructive techniques are usually successful in the long term, they are more expensive and are associated with higher postoperative complication rates.

Marginal tumor resection is an option for the curative-intent management of benign and malignant tumors or for the palliative management of certain tumors, such as tumors that are having a negative impact on quality of life of the patient (e.g. ulcerated tumor causing pain and secondary infection in a patient with metastatic disease). By definition, marginal surgical resection is resection of a tumor with lateral margins less than recommended for the tumor type and/or not including an uninvolved fascial layer for deep margins. The advantage of marginal surgical resection is that the defect is more likely to be able to be closed primarily with a lower risk of wound healing complications; however, the disadvantage is that there may be an increased risk of incomplete histologic excision and local tumor recurrence. Marginal surgical resection should not be recommended solely because primary wound closure would not be possible after a wide surgical resection; however, it should be considered following consent from owners who have been informed of the increased risk of local tumor recurrence after marginal surgical resection, as well as the increased risk of postoperative complications associated with reconstructive surgery following wide surgical resection.

Suggested Diagnostic Workup and Clinical Staging

- Complete blood count, serum biochemistry, and urinalysis
- Fine-needle aspirate, core aspirate, or core needle biopsy
- $\pm$ Sentinel lymph node mapping (see 50.1. *Sentinel Lymph Node Mapping*) or regional lymph node fine-needle aspirate cytology, dependent on tumor type
- $\pm$ Abdominal ultrasound or computed tomography (CT) scan, dependent on tumor type
- $\pm$ Ultrasound-guided fine-needle aspirate cytology of spleen $\pm$ liver for localized histiocytic sarcomas and high-grade mast cell tumors
- $\pm$ Three-view thoracic radiographs or thoracic CT scan for assessment of lung metastasis, dependent on tumor type

Surgical Technique – Wide Surgical Resection (See Plate 1A–D)

- A sterile marker pen can be used to mark appropriate metric or proportional lateral margins around the tumor.
- Skin incisions are made along the marked margins.

Plate 1

Surgical Resection of Cutaneous and Subcutaneous Tumors

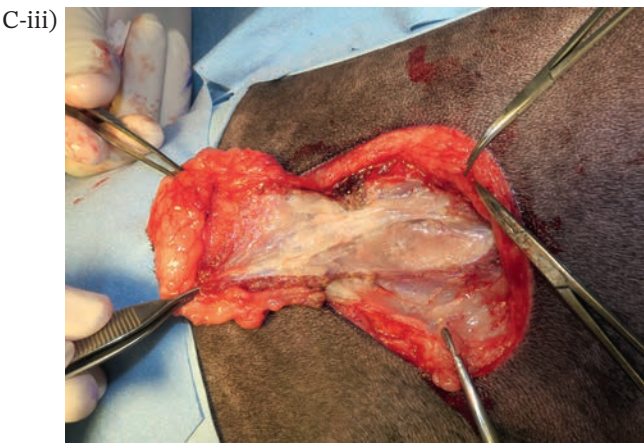
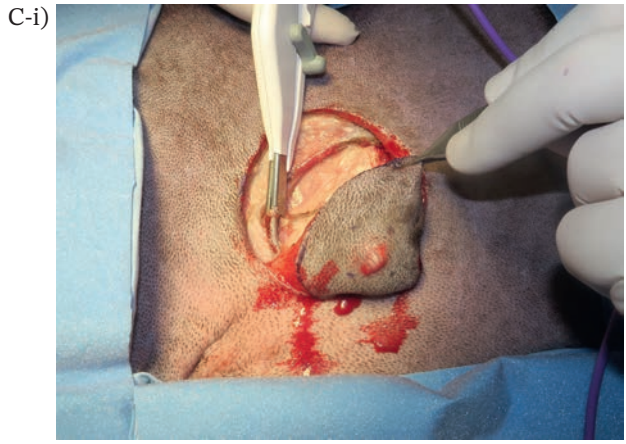


Surgical Technique – Wide Surgical Resection (See Plate 1A–D) *continued*

- C) The dissection is continued deeply through the subcutaneous tissue perpendicular to the skin incision and through the deep fascial layer (i–iii).
- D) The deep fascial layer may include fascia (i), or partial (ii, iii) or full thickness muscle deep to the tumor. Inclusion of this layer very rarely results in functional deficits following surgery.

Plate 1

Surgical Resection of Cutaneous and Subcutaneous Tumors *continued*

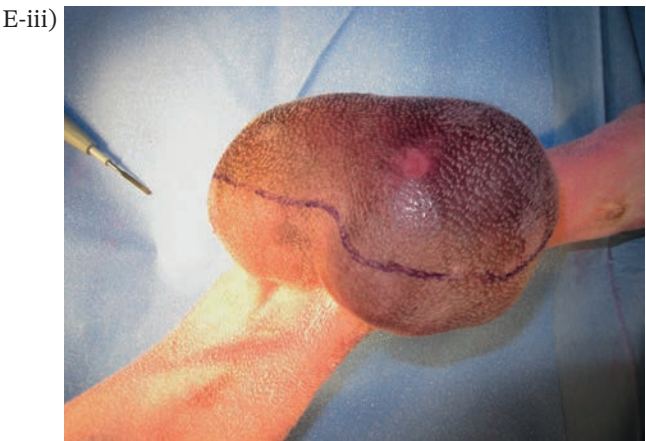


Surgical Technique – Marginal Surgical Resection (See Plate 1E–H)

- E) A sterile marker pen can be used to mark appropriate lateral margins around the tumor (i). If marginal resection of a subcutaneous tumor is planned and the skin is freely movable over the subcutaneous mass (ii), then this skin can be preserved to allow primary closure of the subsequent defect (iii); however, en bloc resection of the skin overlying the tumor is preferred because the tumor can extend microscopically into the overlying skin [3].
- F) Skin incisions are made along the marked margins (i). If a skin incision is being made in freely movable skin over a subcutaneous tumor, then this incision should be done very carefully to prevent compromising the tumor capsule (ii). This can be done by undermining the freely movable skin (iii) and then, once undermined, continuing to incise over the tumor with scissors (iv).

Plate 1

Surgical Resection of Cutaneous and Subcutaneous Tumors *continued*

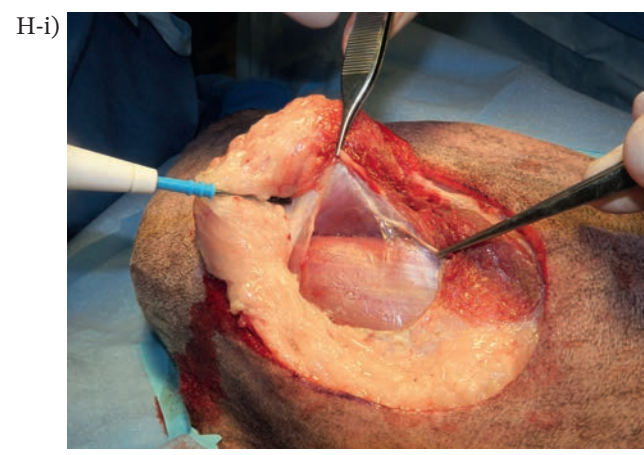
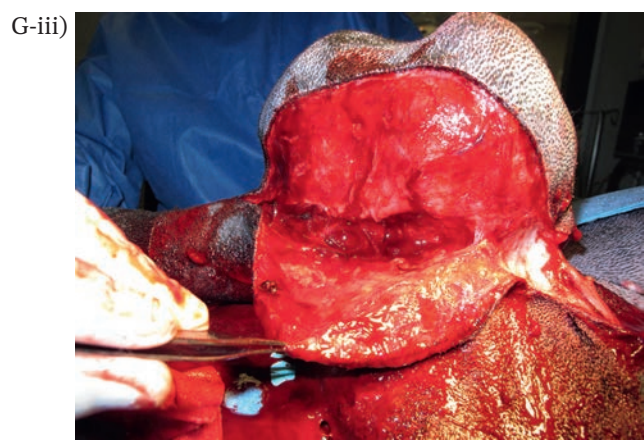


Surgical Technique – Marginal Surgical Resection (See Plate 1E–H) *continued*

- G) The dissection is continued deeply through the subcutaneous tissue perpendicular to the skin incision. If the incision has been made in the movable skin over a subcutaneous tumor, then the freely movable skin should be carefully dissected off the tumor to minimize the risk of compromising the tumor capsule (i–iii).
- H) If a deep fascial layer is planned to be included in the resection, then this may include partial or full-thickness muscle deep to the tumor (i, ii). Inclusion of this layer rarely results in functional deficits postsurgery. If a deep fascial layer is not planned to be included in the resection, then the deep aspect of the tumor should be dissected very carefully off the deeper normal tissue to prevent compromising the tumor capsule (iii, iv).

Plate 1

Surgical Resection of Cutaneous and Subcutaneous Tumors *continued*



Closure (See Plate 1I)

- 1) For primary closure, the deep aspect of the defect can be closed, if required, using 0 to 3-0 absorbable monofilament suture material in a simple interrupted or continuous suture pattern (i, ii). The skin incision is closed routinely in two layers with a simple continuous suture pattern using monofilament absorbable suture material in the subcutis and either an interrupted or continuous suture pattern using monofilament nonabsorbable suture material in the skin (iii–vi).

Postoperative Management

- 1) Multimodal analgesia
- 2) Elizabethan collar

Complications in Dogs [4, 5]

- Overall: 13%–24%
- Surgical-site infection
- Incisional dehiscence
- Seroma

Suggested Adjuvant Treatments

Treatment is dependent on histologic margins, tumor type, and histologic grade.

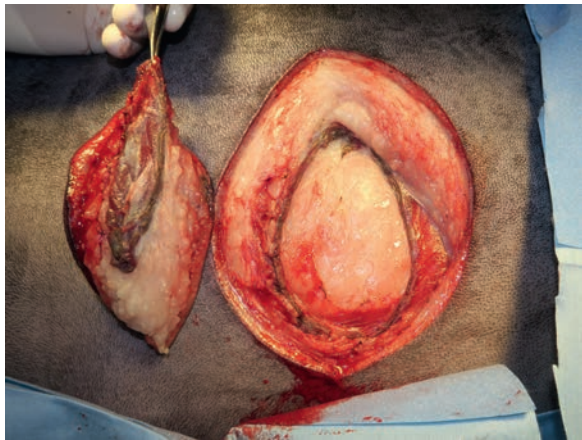
References

- 1 Simpson, A.M., Ludwig, L.L., Newman, S.J. et al. (2004). Evaluation of surgical margins required for complete excision of cutaneous mast cell tumors in dogs. *J. Am. Vet. Med. Assoc.* 224 (2): 236–240.
- 2 Pratschke, K.M., Atherton, M.J., Sillito, J.A. et al. (2013). Evaluation of a modified proportional margins approach for surgical resection of mast cell tumors in dogs: 40 cases (2008–2012). *J. Am. Vet. Med. Assoc.* 243 (10): 1436–1441.
- 3 Del Magno, S., Morello, E., Iussich, S. et al. (2021). Evaluation of the neoplastic infiltration of the skin overlying canine subcutaneous soft tissue sarcomas: an explorative study. *Vet. Comp. Oncol.* 19 (2): 304–310.
- 4 Iodence, A.E., Wallace, M.L., Grimes, J.A. et al. (2021). Dogs undergoing surgical excision of mast cell tumors are not at increased risk of incisional complications. *J. Am. Vet. Med. Assoc.* 260 (suppl 1): S88–S95.
- 5 Cockburn, E., Jonovec, J., Solano, M.A. et al. (2022). Marginal excision of cutaneous mast cell tumors in dogs was not associated with a higher rate of complications or prolonged wound healing than marginal excision of soft tissue sarcomas. *J. Am. Vet. Med. Assoc.* 260 (7): 741–746.

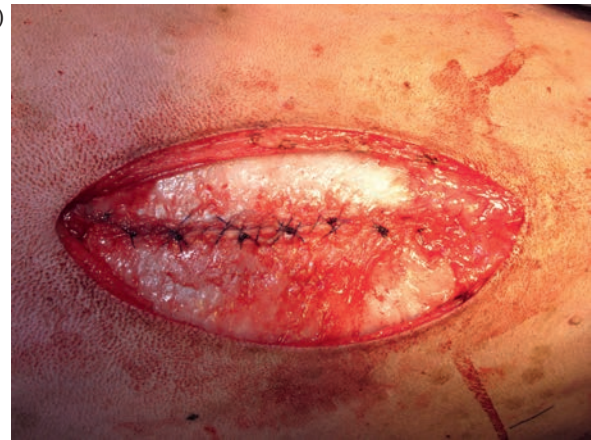
Plate 1

Surgical Resection of Cutaneous and Subcutaneous Tumors *continued*

I-i)



I-ii)



I-iii)



I-iv)



I-v)



I-vi)



