

MULTIPLE DIGITAL SQUAMOUS CELL CARCINOMA OF NAIL - BED EPITHELIUM IN A SPITZ DOG

A.T. FASLU RAHMAN, P. PREENA^{1*}, ASIF M. ASHRAF², M. SAMINATHAN, R. ANOOPRAJ³, K. SHARUN⁴, M.P. DHANANJAI⁵, M.S. SIVAPRASAD⁶, K.M. MANJUSHA³ and K.P. SINGH

Division of Pathology, ⁴Division of Surgery, ⁶Division of Veterinary Public health, Indian Veterinary Research Institute, Izatnagar, Bareilly-243122, India

¹District Veterinary Center, Kannur-670001, ²Veterinary Dispensary, Kandakkai, Kannur-670602, India

⁵Veterinary Hospital Konnakkad, Kasaragod-671313, India

³Department of Veterinary Pathology, College of Veterinary and Animal Sciences, Pookode, Wayanad-673576, India

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SUMMARY

Squamous cell carcinoma is one of the most common malignant epithelial skin tumours of all domestic animals. A six-year-old male Spitz dog was presented to District Veterinary Centre, Kannur, Kerala for treatment with history of inappetance, lameness and a mass entirely covering the dorsal surface of the paw of left forelimb. Grossly, nodular ulcerated mass was noted dorsal to the paw and also proximal to the metacarpal pad of the left forelimb. Radiographic examination revealed soft tissue opacity with underlying bone involvement in the phalangeal and metacarpal region, osteolytic pattern with the disappearance of the entire phalanges of the fourth digit and discrete radiolucency in the distal extremity of the third and fourth metacarpal. On histopathological examination, epidermis with marked dysplasia with loss of polarity of keratinocytes and premature keratinisation in stratum spinosum and dermis with multiple cell nests of neoplastic squamous epithelial cell with typical keratin pearls were revealed. This case report describes the successful surgical management of a rare case of squamous cell carcinoma of the nail-bed epithelium of dog with multiple digital involvements.

Keywords: Dog, Multiple digital mass, Osteolysis, Squamous cell carcinoma

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In canines, malignant neoplastic conditions account for 53.5% of the digital lesions (Wobeser *et al.*, 2007). Among the digital masses with radiographic evidence of bone lysis, 83% were affected with malignant tumours and 17% were benign or pyogranulomatous masses (Marino *et al.*, 1995). The common nail bed tumor in dogs is squamous cell carcinoma (SCC), which accounts for 47.4% of the total malignant digital tumors (Withrow *et al.*, 2013). The SCC of the nail bed epithelium of canine digit is an aggressive neoplastic condition in which invasion and osteolysis of the distal phalanx have often reported (Paradis *et al.*, 1989). Although in canines, 61% of all squamous cell carcinoma cases of skin had been reported in digit, the involvement of multiple digits are rare constituting only 4.7% of the overall incidence of digital tumors in dogs (Goldschmidt, 1984; Henry *et al.*, 2005). Adult dogs were found to be mostly affected and sex predilection has also not been reported by Henry *et al.* (2005). Further, they also stated that, regardless of the type of surgery, surgical intervention in the early stages of a digital tumor had a positive impact on survival time of the animal. The present paper reports a rare case of SCC involving multiple digits of the left forelimb of a dog that

was managed by surgical excision and electrocautery.

A six-year-old male black coated Spitz dog was presented to District Veterinary Centre, Kannur, Kerala with history of inappetance, lameness and a mass entirely covering the dorsal surface of the paw (Fig. 1a). The mass was reported to be present initially on the 3rd and 4th digits of the left forelimb, which had been progressively growing since 8 months. On clinical examination, the presence of a nodular mass of 6-9 cm diameter was observed dorsal to the paw with presence of non-healing ulcers over it. Besides, another ulcerated circumscribed nodular mass was also identified on the ventral surface of the paw, proximal to the metacarpal pad (Fig. 1b). Radiographic examination of the left forelimb revealed soft tissue opacity in the phalangeal and metacarpal region with underlying bone involvement. Osteolytic pattern was noticed with disappearance of the entire phalanges of the fourth digit and discrete radiolucency in the distal extremity of the third and fourth metacarpal (Fig. 1c). Observations in the plain radiographic examination of the thoracic region were apparently normal.

The surgical site was prepared aseptically and preoperative antibiotic prophylaxis was initiated by administration of ceftriaxone @ 30 mg/kg body weight

*Corresponding author: preenalinesh@gmail.com

intravenously one hour prior to the surgery. The patient was premedicated using glycopyrrolate @ 0.04 mg/kg body weight intramuscularly. After 15 minutes, intravenous injections of butorphanoltartarate @ 0.2 mg/kg body weight followed by diazepam @0.5 mg/kg body weight were given. General anaesthesia was induced by ketamine hydrochloride @ 10 mg/kg body weight intramuscularly. Endotracheal intubation was done to provide oxygen at a flow rate of 1.5l/min.

A tourniquet was applied around the carpal joint prior to the incision to aid in intra-operative hemostasis. Marginal excision of the tumor mass was performed with preservation of the limb. A wedge shaped incision was made to remove the whole mass from the dorsal aspect of the paw and a 360° incision was made to remove the mass from proximal to the metacarpal pad in the ventral side (Fig. 1d). Electrocautery was used to control further bleeding and to destroy abnormal tissues in the margins of excision. Roughly circular margins of excision were apposed by purse-string suture (Fig. 1e) using vicryl (2-0). Post-operatively, animal was treated with ceftriaxone @25 mg/kg body wt. for four days intravenously along with meloxicam @ 0.25 mg/kg body wt. for 3 days intramuscularly. Post-surgical wounds were dressed with low-adherence dressing impregnated with chlorhexidine for basic wound contact dressing and bandaged with cotton gauze bandage. The animal made an uncomplicated recovery and started to bear weight on that limb by three weeks (Fig. 1f). No metastasis or recurrence reported during the surveillance period of one year.

The excised mass was preserved in 10% Neutral buffered formalin. After processing and sectioning, the tissue sample was stained with Haematoxylin and Eosin stains (H & E). Histopathological examination of stained tissue sections revealed diffuse hyperplasia and marked dysplasia in the epidermis with loss of polarity of keratinocytes as well as broad and elongated rete pegs (epithelial extensions project into the underlying connective tissues). Epidermis also showed multifocal areas of necrosis and premature keratinisation in the stratum spinosum (Fig. 2a). Dermis was largely occupied by multiple nests of neoplastic squamous epithelial cells and central more matured squamous cells. These cell nests also showed presence of keratin pearls. Neoplastic squamous cells had vesicular pleomorphic nuclei and one to multiple nucleoli exhibiting marked variation in size. Borders of the neoplastic cells were indistinct with loss of spinous processes and mitotic figures were frequent (Fig. 2b). These characteristic histopathological findings confirmed it as a case of SCC, graded as a well differentiated subtype.

Further, based on gross appearance, radiographic findings and histopathological examination, it was diagnosed as a case of SCC of nail-bed epithelium of dog with multiple digital involvements.

The SCC is a malignant neoplasm arising from squamous epithelium and is the most frequently reported type of malignant epithelial neoplasm in dogs (Goldschmidt, 1984). Major risk factor for induction of SCC is prolonged ultraviolet exposure, immuno suppression, viral infection, as well as preceding trauma or burn to the region also suggested as predisposing factors for the tumour development (Hargis and Thomassen, 1979; Goldschmidt *et al.*, 2006; Gourley *et al.*, 1982). The SCC can arise from various locations in the body of canines with a predilection for the skin (44.9%) and oral cavity (44.9%), less frequently in the mammary gland, nasal cavity, lungs and urinary bladder (Goldschmidt, 1984). Depending on the location of tumour, SCC in canines differs strikingly in its pathological behavior (Goldschmidt and Goldschmidt, 2016). Formerly, this phenomenon of multiple digital SCC had been reported in dogs with black pigmentation by Ewing *et al.* (1968), as observed in the present case. The propriety of increased surveillance was recommended in dogs with dark pigmentation for other digital masses when presented with digital SCC (Henry *et al.*, 2005). As per Belluco *et al.* (2013), the incidence rate on the forelimb was higher when compared with the hind limb, in concurrence with the present study. Nevertheless, there is no difference in predilection between right and left limbs or among the different digits of the same limb. As per the findings of Belluco *et al.* (2013), age of occurrence of digital SCC in dogs was ranged between 4 to 16 years, which is in line with the findings of current study. Large black dog breeds including Standard Poodle, Giant Schnauzer and Rottweiler have been reported as overrepresented in digital SCC cases (Wobeser *et al.*, 2007). Unlike the previously reported cases, the present case was observed in a Spitz, a short breed of dog.

Goldschmidt and Goldschmidt (2016) stated that grading method for SCC is based on the histological differentiation of the neoplasm and in the present case, malignant neoplasm of epidermis, the cells show differentiation to keratinocytes. In the present case, dermis was largely occupied by multiple nests of well differentiated neoplastic squamous cells with keratin pearls and hence it was graded as a well differentiated subtype of squamous cell carcinoma. The SCC of the digit has a greater metastatic potential and chance of recurrence in dogs (Weiss and Frese, 1974). However, in the present case, the dog recovered uneventfully after the surgical excision of the mass and no

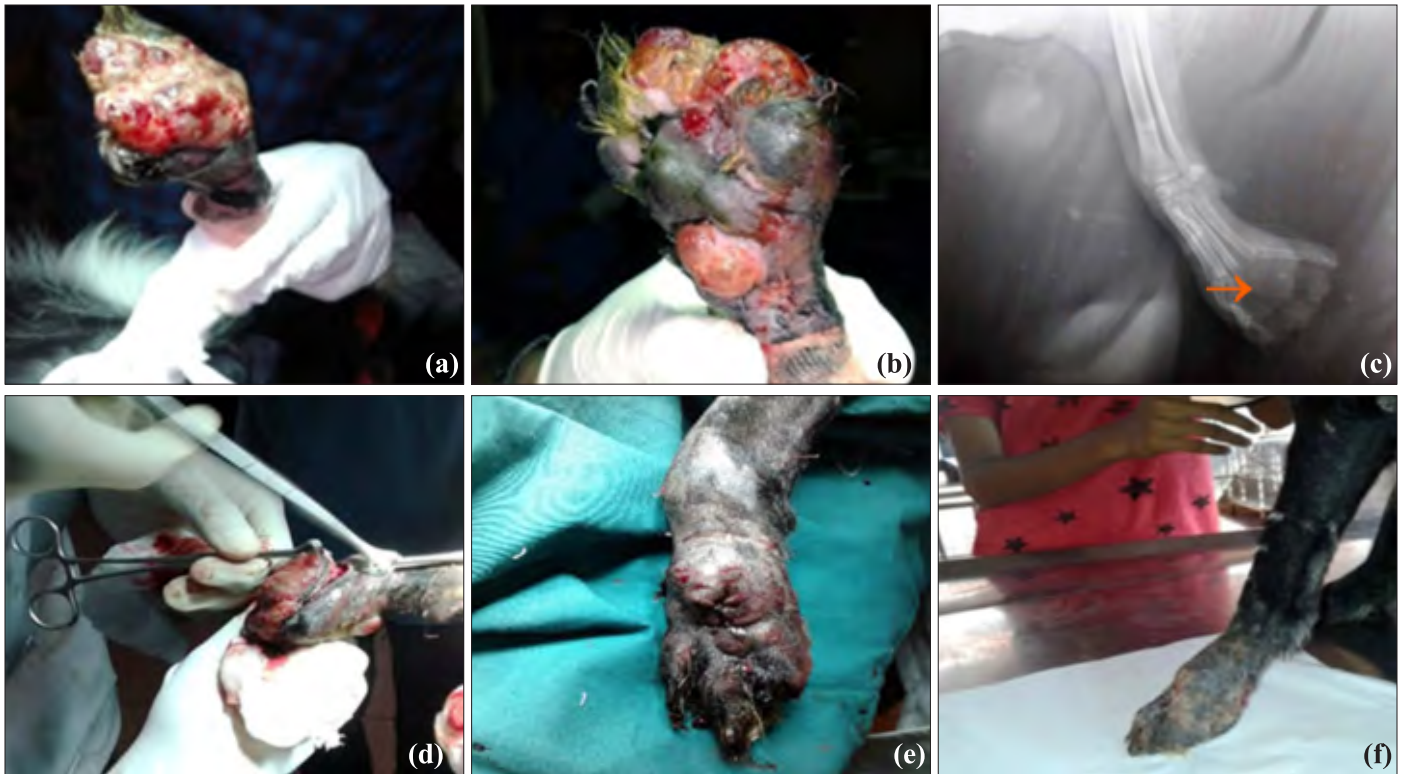


Fig. 1. (a) Dorsal view of paw of left forelimb showed nodular irregular mass with ulcerated surface and loss of claws on 3rd and 4th digits; (b) Ventral view of paw of left forelimb showed a circumscribed ulcerated nodular mass located proximal to the metacarpal pad; (c) Plain radiography (dorsopalmar view) of left paw showed soft tissue opacity in the phalangeal and metacarpal region, and entire phalanges of 4th digit had osteolysis, disappeared (arrow) and a discrete radiolucency in the distal extremity of 3rd and 4th metacarpal; (d) Surgical excision of the nodular ulcerated tumour mass from the dorsal surface of the paw; (e) Reconstructed paw following the surgical excision of nodular ulcerated tumour mass; (f) After 4 weeks of surgical excision, wound completely healed and animal started to bear weight on left forelimb

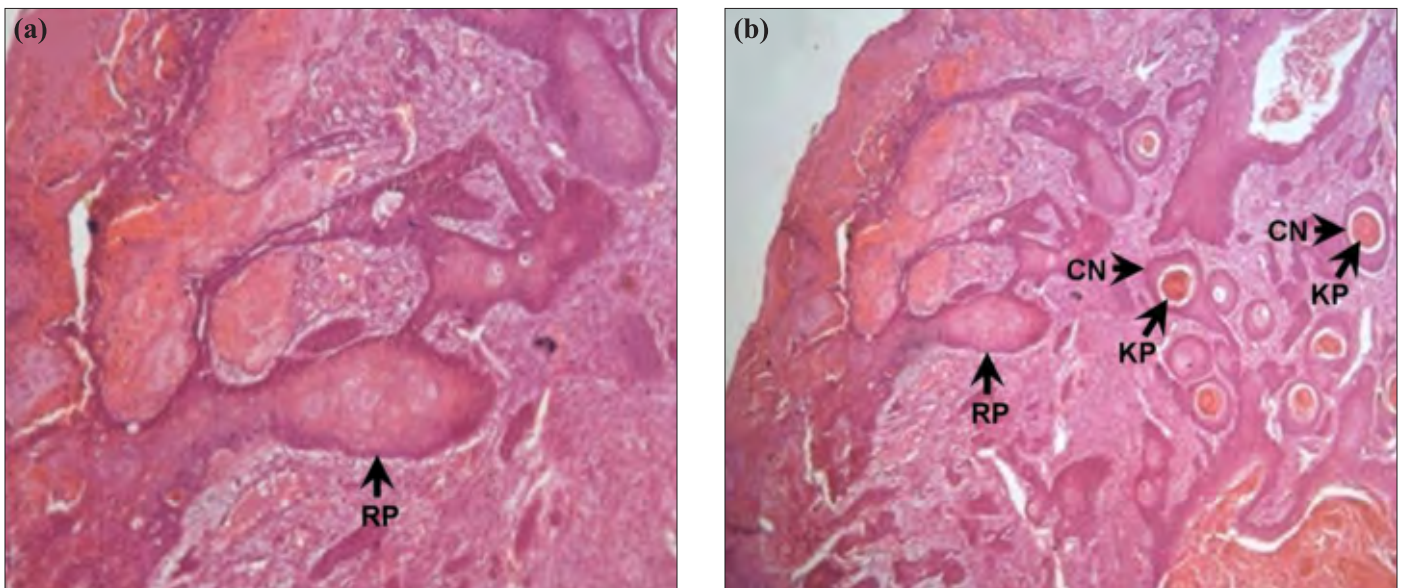


Fig. 2 (a). Epidermis showing marked dysplasia with loss of polarity of keratinocytes, premature keratinisation in stratum spinosum, necrosis and epidermal protrusions into the dermis, rete pegs (RP). (b) Dermis showing multiple cell nests (CN) of neoplastic squamous epithelial cell along with typical keratin pearls (KP)

recurrence and metastasis could be noticed during a surveillance period of one year.

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REFERENCES

- Belluco, S., Brisebard, E., Watrelot, D., Pillet, E., Marchal, T. and Ponce, F. (2013). Digital squamous cell carcinoma in dogs: epidemiological, histological, and immunohistochemical study. *Vet. Pathol.* **50(6)**: 1078-1082.
- Ewing, G.O., Stannard, A.A. and Bond, G.H. (1968). Multiple squamous cell carcinoma of the nailbed in the canine. *California Vet.* **22**:16-17.
- Goldschmidt, M.H. (1984). Basal-and squamous-cell neoplasms of dogs and cats. *Am. J. Dermatopathol.* **6(2)**: 199-206.
- Goldschmidt, M.H. and Goldschmidt, K.H. (2016). Epithelial and melanocytic tumors of the skin. In: Baba, A.I. and Catoi, C. (Edts.). *Comparative Oncology*. The Publishing House of the Romanian Academy, Bucharest (RO).
- Goldschmidt, M.H., Kennedy, J.S., Kennedy, D.R., Yuan, H., Holt, D.E., Casal, M.L., Traas, A.M., Mauldin, E.A., Moore, P.F., Henthorn, P.S. and Hartnett, B.J. (2006). Severe papilloma virus infection progressing to metastatic squamous cell carcinoma in bone marrow-transplanted X-linked SCID dogs. *J. Virol.* **80(13)**: 6621-6628.
- Gourley, I.M., Madewell, B.R., Barr, B. and Ettinger, S.J. (1982). Burn scar malignancy in a dog [Neoplasms]. *J. Am. Vet. Med. Assoc.* **180**: 1095-1097.
- Hargis, A.M. and Thomassen, R.W. (1979). Animal model: solar dermatosis (keratosis) and solar dermatosis with squamous cell carcinoma. *Am. J. Pathol.* **94(1)**: 193-196.
- Henry, C.J., Jr, W.G.B., Whitley, E.M., Tyler, J.W., Ogilvie, G.K., Norris, A., Fox, L.E., Morrison, W.B., Hammer, A., Vail, D.M. and Berg, J. (2005). Canine digital tumors: a veterinary cooperative oncology group retrospective study of 64 dogs. *J. Vet. Int. Med.* **19(5)**: 720-724.
- Marino, D.J., Matthiesen, D.T., Stefanacci, J.D. and Moroff, S.D. (1995). Evaluation of dogs with digit masses: 117 cases (1981-1991). *J. Am. Vet. Med. Assoc.* **207(6)**: 726-728.
- Paradis, M., Scott, D.W. and Breton, L. (1989). Squamous cell carcinoma of the nail bed in three related giant schnauzers. *Vet. Rec.* **125(12)**: 322-324.
- Weiss, E. and Frese, K. (1974). International histological classification of tumors of domestic animals: tumours of the skin. *Bull. World Health Organ.* **50(1/2)**: 79-100.
- Withrow, S.J., Vail, D.M. and Page, R. (2013). *Withrow and MacEwen's Small Animal Clinical Oncology-E-Book (5th Edn.)*, Elsevier Saunders, St. Louis, Missouri.
- Wobeser, B.K., Kidney, B.A., Powers, B.E., Withrow, S.J., Mayer, M.N., Spinato, M.T. and Allen, A.L. (2007). Diagnoses and clinical outcomes associated with surgically amputated canine digits submitted to multiple veterinary diagnostic laboratories. *Vet. Pathol.* **44(3)**: 355-361.