

1 **Subungual exostosis with post-operative recurrence followed by spontaneous**
2 **regression**

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19 Dear editor,

20 Subungual exostosis (SE) is a relatively uncommon osteocartilagenous tumor
21 of the digital phalanges. Although post-operative recurrence sometimes develops, cases
22 with spontaneous regression have not been reported. We report a case of SE with
23 post-operative recurrence followed by subsequent spontaneous regression.

24 A 9-year-old girl presented with a 6-month history of a growing, painful nodule
25 on the right hallux. Physical examination revealed a 10 mm nodule extending from
26 beneath the nail plate of the hallux (Fig.1a). Radiographs revealed a calcified lesion
27 which was continuous with the distal phalangeal cortex (Fig.1b). SE was suspected and
28 the nodule was resected, including the base at the cortex, until cancellous bone was
29 observed. Intraoperative radiographs confirmed optimal removal of the calcified lesion
30 (Fig. 1c). Histology of the resected tissue revealed a normal trabecular bone and
31 fibrocartilaginous tissue, consistent with SE (Fig. 1d). One month after the surgery, the
32 nodule developed again and grew until 2 months after the initial surgery. Radiographs
33 then demonstrated a calcified lesion at the same location, confirming recurrence of SE
34 (Fig. 1e), and a proposed re-excision was refused by the patient and family. In spite of a
35 lack of surgical intervention, however, the nodule gradually decreased in size and finally
36 disappeared 8 months after the surgery. Radiographs also revealed that most of the

37 calcified lesion had spontaneously regressed (Fig. 1f).

38 The precise pathogenesis of SE remains unknown, but trauma and hereditary
39 abnormalities have been suggested as possible inducing factors for SE. The recurrence
40 of SE sometimes happens within a few months after surgery^{1, 2}. In contrast, there have
41 been no reports of SE with spontaneous regression, although only a few cases of
42 exostosis with spontaneous regression in other bones (such as the humerus and radius)
43 have been reported³. Since a fracture of the lesion or adjacent regions may be followed
44 by regression of exostosis, previous reports pointed out that bone remodeling induced
45 by trauma is one of the possible mechanisms³. Generally, the bone fracture repair
46 process consists of 3 phases: inflammation, renewal, and remodeling⁴. Numerous
47 cytokines and growth factors such as interleukin(IL)-1, IL-6, and transforming growth
48 factor (TGF)- β are produced at the injury site in the inflammation phase, promoting the
49 proliferation and differentiation of mesenchymal stem cells into osteoblasts which form
50 callus woven bone in the renewal phase⁴. In the remodeling phase, osteoblasts and
51 osteoclasts mediate the replacement of the woven bone with lamellar bone through
52 renewing and resorptive actions by diverse factors. IL-1, IL-6 and TGF- β are also
53 involved in the regulation of the remodeling phase through promotion of osteoclast
54 formation^{4, 5}. Therefore, although the exact mechanism remains unclear, we speculate

55 that some factors such as IL-1, IL-6 and TGF- β induced by the surgery may promote not
56 only the formation of woven bone in the renewal phase but also the resorption of the
57 bone in the remodeling phase, resulting in post-operative recurrence followed by
58 spontaneous regression of SE in our case. Our case suggests that trauma, including
59 surgeries, may have a dual function for induction and regression of SE.

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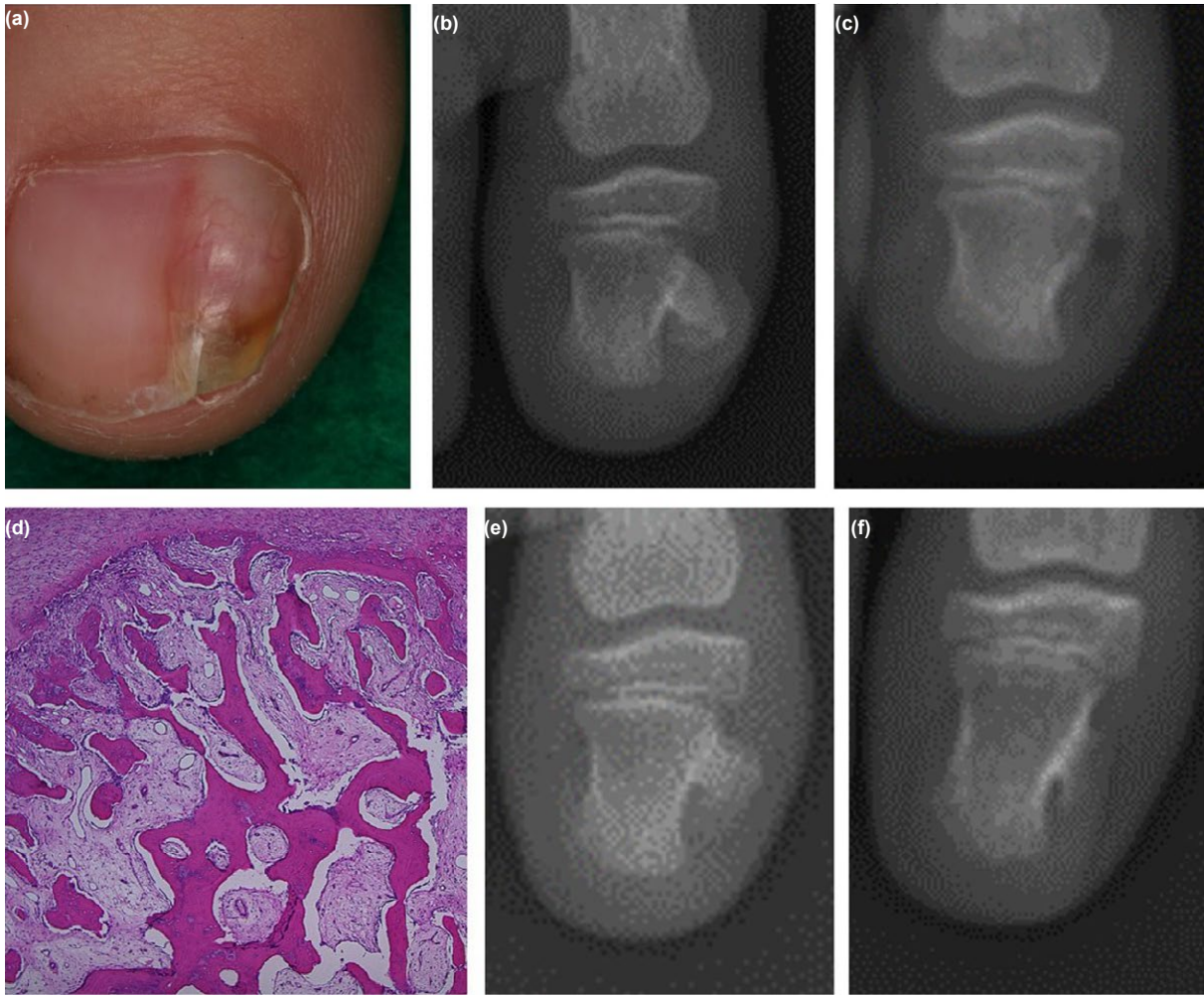


Figure 1. (a) A nodule beneath the nail plate on the right hallux. (b) The nodule showed a calcified lesion continuous with the distal phalangeal cortex. (c) Optimal removal of the lesion was confirmed by intraoperative radiography. (d) The lesion revealed a normal trabecular bone and fibrocartilaginous tissue (hematoxylin–eosin, original magnification 940). (e) A radiograph from 2 months after the surgery. A calcified lesion recurred at the same location. (f) A radiograph from 2 years after the surgery. Most of the recurrent calcified lesion spontaneously regressed.