

# Socket sclerosis, a rare complication in orthodontic tooth movement

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## Abstract

Socket sclerosis is usually asymptomatic and does not require any treatment. The only potential complication arises during orthodontic treatment, wherein sclerosed socket of the premolar teeth may be an obstacle in closing the space by movement of teeth through the extraction space. This article demonstrates the problems encountered during the orthodontic treatment of a 20-year-old Malaysian woman with socket sclerosis and the treatment strategy employed to overcome the same.

**Keywords:** Orthodontic treatment, problems encountered and management, socket sclerosis

## Introduction

Tooth extraction is the most common type of bone injury, following which, bone healing takes place in an orderly sequence. Any disturbance in the osteogenic-osteolytic balance can lead to an alteration in bone metabolism, thus altering the sequence of events involved in the repair of extraction site. One of the altered patterns of socket healing is termed as "socket sclerosis".<sup>[1]</sup> It is characterized by lack of lamina dura resorption, and deposition of sclerotic bone within the confines of lamina dura. The deposition begins along the inner aspect of the lateral walls of the alveolar socket and continues centripetally. This pattern of bone deposition leads to increased thickness and density of bone in the peripheral region, while the center appears less dense. On radiographic examination, the density of the osteosclerotic bone resembles the root dentin, and the central radiolucent area potentially mimics a root canal. At this point in the healing process, a dentist may be erroneously accused of having failed to extract the root.<sup>[2]</sup> As the healing progresses, the deposition continues in the center, resulting in an entire socket of uniform density within the confines of the unresorbed lamina dura.

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Being nothing more than hyperplastic tissue, socket sclerosis is usually asymptomatic, and does not require any treatment. The only potential complication arises during orthodontic treatment, wherein sclerosed socket of the premolar teeth may be an obstacle in closing the space by movement of teeth through the extraction space.<sup>[3]</sup>

This article demonstrates the problems encountered during the orthodontic treatment of a 20-year-old Malaysian woman with socket sclerosis and the treatment strategy employed to overcome the same.

## Case Report

A 20-year-old Malaysian woman presented with Angle Class I bimaxillary protrusion [Figures 1-2]. The main objective in treating this case was reducing upper- and lower-lip protrusion by retraction of the maxillary and mandibular anterior teeth. In order to gain space for the retraction, four first premolars were extracted. After the extractions, fixed pre-adjusted appliance (0.022 inch × 0.028 inch slot) and 0.016 inch nickel titanium (Ni-Ti) archwire were placed. Subsequent to initial alignment, canine retraction was initiated on a 018 special plus Australian wire, using an elastomeric chain applying 150 g of force [Figure 3]. After 3 months of upper canine retraction, right canine moved 1 mm while left canine had moved 3 mm [Figure 4]. The patient recalled that extraction of the upper right premolar had been difficult and required more time. An intraoral periapical radiograph of the area was made. There appeared to be a radiopacity in the socket, suggestive of a retained root stump [Figure 5]. Assuming from the history of "difficult extraction" that the root might have broken, an attempt was made to retrieve the same.

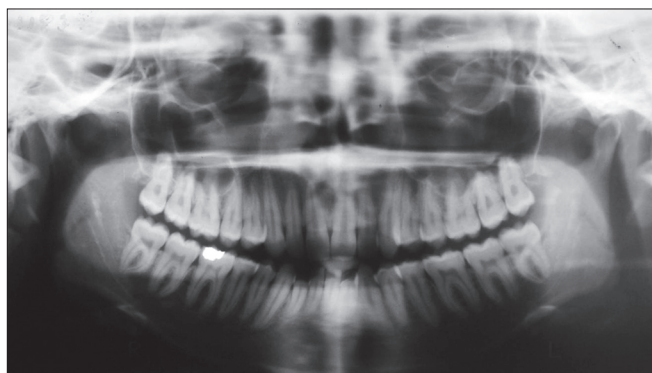
## Surgical treatment

Under local anesthesia, a buccal mucoperiosteal flap was made with relieving incisions to gain access to the alveolus and socket. Socket healing appeared to be nearly complete with no external visible evidence of a retained, broken root fragment. Another radiograph, with a cone shift technique,

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**Figure 1:** Pretreatment photographs



**Figure 2:** Pretreatment panoramic view

demonstrated a radiopacity in the socket, which was not well defined, as it appeared in the previous periapical radiograph [Figure 6]. Further, detailed inspection of the radiograph revealed trabeculae-like pattern of the opacity that was assumed to be a root stump. A diagnosis of “socket sclerosis” was made. Using a round steel bur in a straight handpiece at low speed, a cylindrical bur hole was drilled into the alveolus under copious saline irrigation. The bur hole was drilled into the sclerotic bone, taking care not to perforate or thin the buccal cortex and prevent damage to the adjacent tooth roots [Figure 7]. Thorough irrigation was done with normal saline and the wound was sutured. Subsequent to surgical intervention, immediate distal traction was applied to canine and further tooth movement proceeded normally [Figures 8-10].

### Discussion

This case report was aimed at demonstrating the successful orthodontic management of a patient with socket sclerosis, where it became almost impossible to move the canine through the dense sclerotic bone formed in the extraction socket of first premolar. One of the primary concerns was the lack of microcirculation and viable bone cells in the sclerotic bone, which are the prerequisites for orthodontic bone remodeling.<sup>[4]</sup> The treatment approach employed was surgical intervention to remove a part of the sclerotic bone, following which the tooth movement proceeded normally. This treatment strategy was based on the sound biologic concept of regional acceleratory phenomenon (RAP),<sup>[5]</sup> wherein the increase of bone turnover and decrease of bone density accelerated the tooth movement even without using heavier orthodontic forces.

To date, only one reference could be found in the literature that illustrated the difficulties in space closure during orthodontic treatment, in the presence of socket sclerosis.<sup>[3]</sup> The author proposed the use of orthodontic mini implants and a heavier force, which would be necessary to initiate remodeling of the bone. But the assumption cannot be substantiated as the use of mini implant does not alter the biologic basis of tooth movement and the use of heavy orthodontic force has been criticized abundantly for its adverse effects.<sup>[6-8]</sup>

Performing selective alveolar bone corticotomies may be a viable alternative to increase the biological response to the mechanical stimuli caused by conventional orthodontic appliances. However, this treatment approach was deferred as it is often associated with slight interdental bone loss, decrease of attached gingiva<sup>[9]</sup> and periodontal defects observed in some cases with short interdental distance.<sup>[10]</sup> In the current case, no significant reduction in the crest bone height, decrease of attached gingiva, marked apical root resorption, or devitalization were observed after the orthodontic treatment. Therefore, after a thorough review





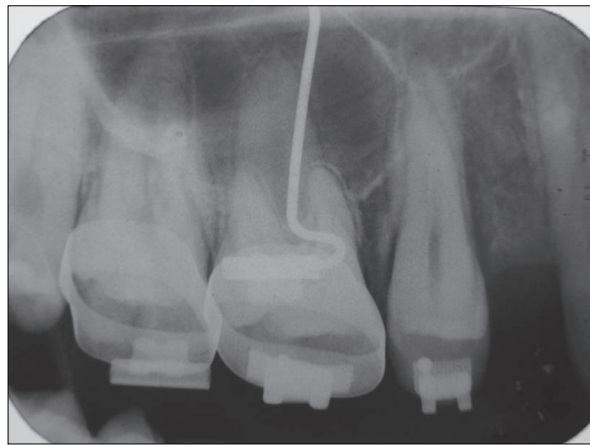
**Figure 3:** Canine retraction



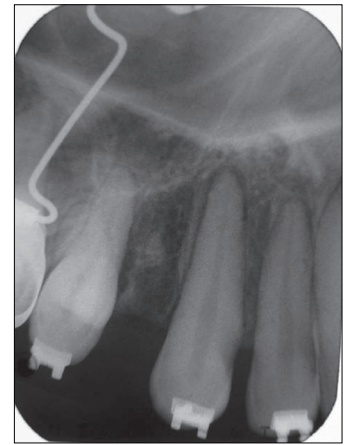
**Figure 4:** Canine retraction after 3 months



**Figure 5:** Periapical radiograph showing socket sclerosis of extraction socket of maxillary right first premolar



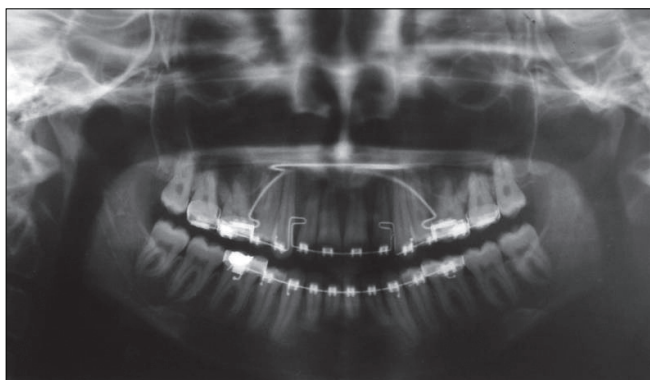
**Figure 6:** Intraoral peri apical radiograph taken with different angulation



**Figure 7:** Surgical removal of sclerosed bone



**Figure 8:** After successful space closure



**Figure 9:** Panoramic view after space closure

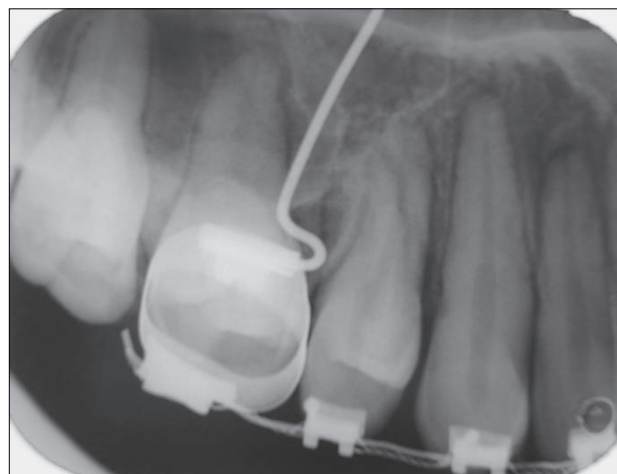
of the possible clinical strategies, the treatment approach employed in the present case can be justified as a suitable way to overcome the difficulty in orthodontically moving the teeth through sclerosed bone.

### Conclusion

Socket sclerosis is a rare and asymptomatic condition, but may cause problem during orthodontic closure of extraction spaces. Surgical intervention to remove a part of sclerosed bone and immediate application of force would help to overcome the problem.

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**Figure 10:** Periapical view after space closure

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