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Periapical Disease

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THE REPARATIVE CAPACITY OF PERIAPICAL TISSUES

The diseases of the periapical or periradicular tissues must be considered in the context of the larger category of diseases of the attachment apparatus of the tooth. These structures include the radicular cementum, the bone, and the periodontal ligament.

Pulp disease is one cause of disease in this apparatus, which may also be injured by periodontal disease, occlusal trauma, or various combinations of a number of factors.

The diseases of the attachment apparatus of the tooth can therefore be of endodontic or periodontal origin, secondary to occlusal trauma, or a result of a combination of several etiologic factors.

Endodontic diseases of the attachment apparatus of the tooth will now be considered.

Because of the close relationship between the pulp and periradicular tissue, it is easy to see that inflammation of the pulp may cause inflammation in the periodontal ligament, even before the entire pulp has become necrotic. When the necrosis is complete, bacteria with their toxins, immunological agents, and the products of pulp degeneration and tissue necrosis reach the periradicular zone through pathways (portals of exit) by which the endodontium and periodontium communicate. This gives rise to inflammatory and immunologic reactions which are simply called *lesions of endodontic origin*, using a etiopathogenic criteria.⁷¹

To better understand their significance, it is useful to recall the analogy provided in 1939 by Kronfeld,¹⁶ who likened the bacteria in an infected root canal to an army of enemies entrenched behind high, inaccessible mountains.

This army tries to descend through a mountain pass (the apical foramen) to invade the plains beyond the

pass (the periodontal soft tissue and surrounding tissues). Another army in the plains controls the pass. Having constructed trenches and fortifications (granulation tissue), it tries to block the advance of the mountain army. The defending army represents the white blood cells and other cells of the granulation tissue. Naturally, the soldiers of the defending army are grouped around the opening of the pass which the enemy is trying to conquer. This is analogous to the accumulation of white cells near the opening of the apical foramen (Fig. 8.1).

Nothing may happen for a long time. Occasionally, some soldiers of the mountain army (bacteria) descend through the pass (apical foramen), but they are usually captured and destroyed by the defenders (blood cells). At a certain point, however, the army of mountain soldiers mounts a massive attack and the battle begins. Such a battle between invasive bacteria and the tissues of the organism is clinically manifested as acute inflammation.

The outcome of this battle may vary. The bacteria may win and invade the plains. This is clinically manifested as an acute alveolar abscess or even septicemia. On the other hand, the defenders – the white blood cells – may win. They may overwhelm the invading bacteria and then the rest of the mountain army is confined anew beyond the pass, in the root canal, through which the white cells have no access.

This analogy may be carried further. If the attacking mountain army (the bacteria) are eliminated either by extraction of the tooth or sterilization of the root canal, the defending army is no longer necessary and is thus withdrawn. The granulation tissue withdraws, and the soldiers (white cells) leave and return to the general circulation to be used somewhere else to repulse a similar attack. This explains why the apical granulation tissue disappears after extraction of an infected tooth or following appropriate root canal therapy.

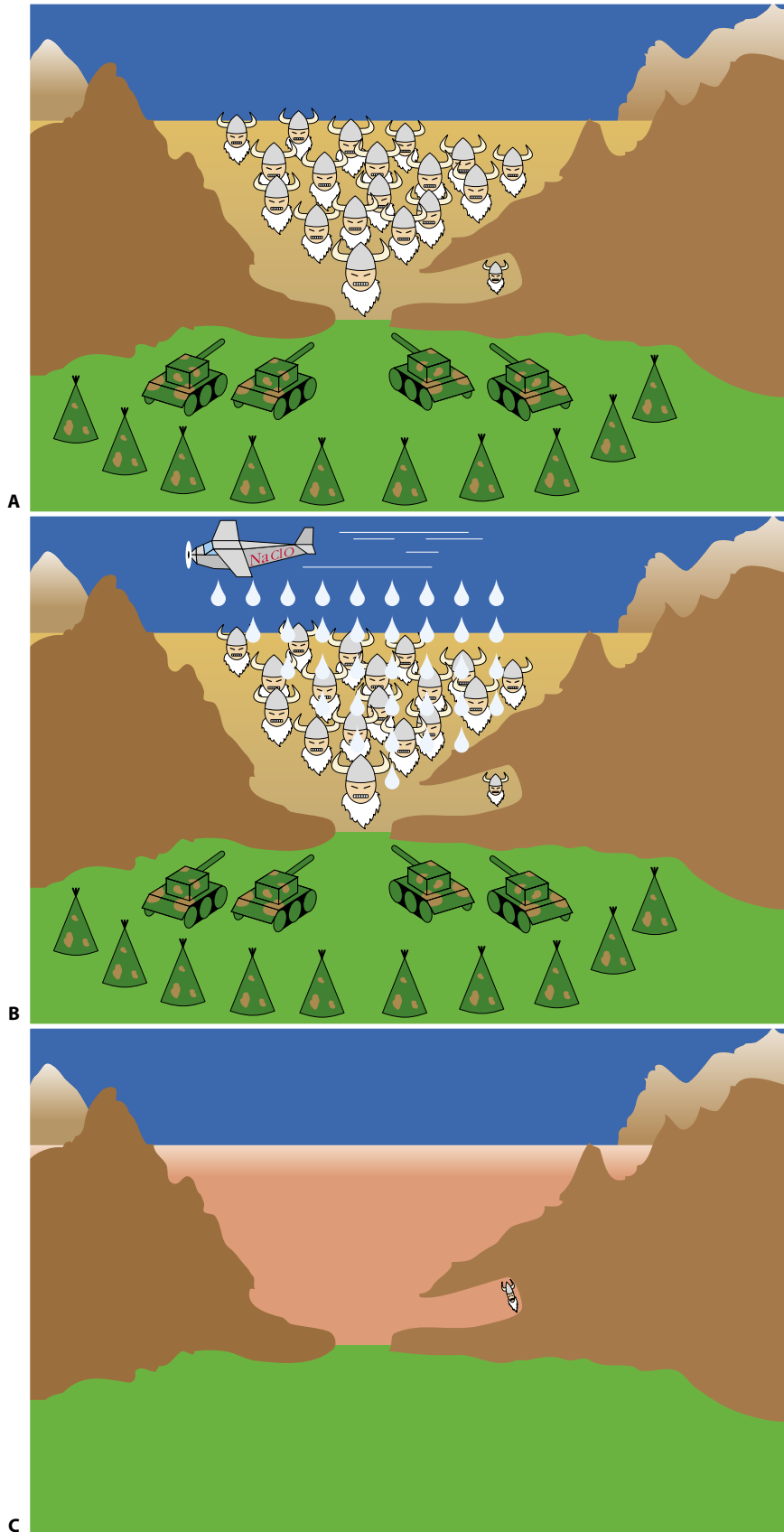


Fig. 8.1. Analogy between the defence mechanism of granulation tissue and the defence of a mountain pass. **A.** Acute and chronic inflammatory cells guard the “pass”. **B.** The invading enemies may be neutralized only by a surprise attack from behind, for example by irrigating solutions and endodontic instruments. **C.** Once the invading enemies have been eliminated, the defending soldiers abandon the pass, which no longer needs to be defended. Everything returns to normal, and the situation remains unaltered in the time after the space that had been previously occupied by the enemies is completely filled in three dimensions. In this manner, any escaped “enemies” that may be “hidden” in a ravine after the cleaning procedure, are also neutralized.