The initial assumption was that anesthetic solution injected via intraligamentary anesthesia would spread along the periodontal ligament (PDL) space to the apical area. Concern existed about possible damage resulting from the anesthetic solution being forced down the PDL space. However, animal experimental studies revealed that intraligamental injected anesthetic solution enters the cancellous bone and spreads intraosseously to the apical area by avoiding the PDL route[1, 2].

That is the name of the intraligamentary anesthesia technique refers to the site of needle injection but not to the direction of the local anesthetics’ spread[2]. Furthermore, histological examinations have demonstrated that any tissue changes caused by needle or anesthetic injection are localized, minor and reversible[3, 4, 5].

The following two studies demonstrate the pathway of spread and the histological effects of intraligamentary anesthesia.


Giving a hand to oral health.
Pathway of spread – Garfunkel et al.
Intraligamentary-intraosseous anesthesia. A radiographic demonstration.

Objective
Aim of the study was to investigate the spread of intraligamental injected anesthetics through the dental tissues.

Materials and Methods
Baboon monkeys received intraligamental injection of radiopaque material in four different permanent teeth. Increments of 0.4 ml of contrast medium were injected using a pistol type syringe with an ultra-short 30 gauge needle advanced about 2 – 3 mm into the periodontal ligament. Serial radiographs were taken during the injection procedure to visualize the pathway of the injected radiopaque material spread.

Results
The radiographs revealed a concentration of the injected radiopaque material adjacent to the needle tip followed by a clouding of the crestal bone area. The opacity advanced through the alveolar bone crest and bone marrow spaces to the apical area. The PDL space remained clear of radiopaque material.

Conclusion
The intraligamental injected material spread intraosseously to the apical area under avoidance of the PDL space. The authors presumed that the solution is redirected into the surrounding cancellous bone through the fenestrations in the dental socket. The intraligamental anesthesia approach was concluded to exert its effect by spreading intraosseously to the apical area.

Histological effects – Galili et al.
Intraligamental anesthesia – A histological study.

Objective
The study’s purpose was the evaluation of possible damage to periodontal tissues when administering intraligamental anesthesia.

Materials and Methods
A baboon monkey received intraligamental anesthesia with a pistol type syringe at 14 different teeth 22, 15, 8, 3 days as well as 1 day and 1 h before histological examination. Each tooth, mesially and distally, received 0.2 ml lignocaine 2 % with 1:100,000 epinephrine using an extra-short 30 gauge needle which was inserted about 2 – 3 mm deep into the periodontal ligament. Respective contralateral teeth did not receive any injection and served as control. Longitudinally cuts of the teeth were histologically examined under the microscope.

Results
Histological examination of the teeth which received intraligamental injection 1 h, 1 day respectively 3 days before, revealed a defined damage to the gingival tissue but no signs of damage to the alveolar bone or cementum. In most of the specimens the histological changes already disappeared within 8 days. After 15 days but at the latest after 22 days the histological picture returned to normal and complete healing was found.

Conclusion
The histological effects remained limited to the needle penetration depth. No damage of the periodontal ligament apical the penetration site was found. Overall, no bone or cementum damage was detected. All signs of initial detected histological changes were found to subsequently completely heal. Due to only localized, minor and reversible histological changes the intraligamental anesthesia was considered a safe anesthetic technique.

Source

Source

In the literature described unwanted effects like elongation of teeth or post-injection pain are mainly attributed to a too fast injection[6]. Results of recent clinical studies show that controlled slow intraligamental injection barely induces unwanted side effects[6, 7]. Zugal documented 205 cases of intraligamental injection, without any patient reporting tooth elongation or pressure pain after subsidence of anesthesia[6]. Also among 202 clinical cases of intraligamental injection documented by Glockmann et al. only 2 cases of elongation feeling occurred[7]. In both investigations controlled slow injection was performed, i.e. at least 20 seconds for 0.2 ml anesthetic solution per root, to allow sufficient time for the solution to diffuse in the surrounding tissue[6, 7].

As the initially common injection systems of the pistol-type hardly allow a controlled injection procedure[6] and often are associated with post-injection complications, they are considered as obsolete nowadays[6, 9].