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THE SOCKET SHIELD TECHNIQUE: A REVIEW ARTICLE

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Abstract:
The prosthetic rehabilitation of implants can prove to be challenging in cases of atraumatic extraction with immediate implants due to loss of buccal bone (both vertically and horizontally) as well as flattening of the interproximal bony scallop. This presents a difficult situation for the restoration with acceptable aesthetics especially in maxillary anterior teeth.
Socket Shield Technique is a relatively novel technique which prevents the loss of buccal/facial bone with minimal surgical intervention, less duration of total treatment and an optimum aesthetic result. It aims to preserve the buccal two-third of the root in socket so that the periodontium, bundle bone and the buccal bone remains intact. The buccal bone has bilateral blood supply from the gingiva above and the periodontium below. Once a tooth is extracted, buccal bone is deprived of the blood supply from socket side and this result in the loss of some buccal bone. The root section preserves the periodontal attachment apparatus that includes periodontal ligament, cementum and alveolar bone. The root fragment remains vital and undamaged and prevents the expected post-extraction socket remodelling and also supports the buccal/facial tissues.

Introduction:
What exactly is Socket Shield?
The socket-shield technique is a treatment protocol where a portion of the root is intentionally left behind in the alveolar bone to prevent the collapse of the natural gingival and underlying bone contour.
Following tooth extraction, the periodontal ligament which holds the tooth in the bone is also removed. The periodontal ligament contains a vital blood and nerve supply for the bone. The periodontal ligament also plays a major role in the alveolar bone remodelling process [(1)]. It is

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able to induce bone resorption and bone formation by the stimulation of osteoblasts and osteoclasts. Therefore, removing the ligament leads to bone resorption due to the lack of nutrients from the periodontal ligament's blood supply [(2)]

This technique avoids this outcome by removing only a part of the root while preserving the outer root section (or 'shield'). Retaining this section mitigates bone resorption and aids in avoidance of the resultant collapse of the bone and soft tissue. Immediate placement of implants is proceeded [(3)] .

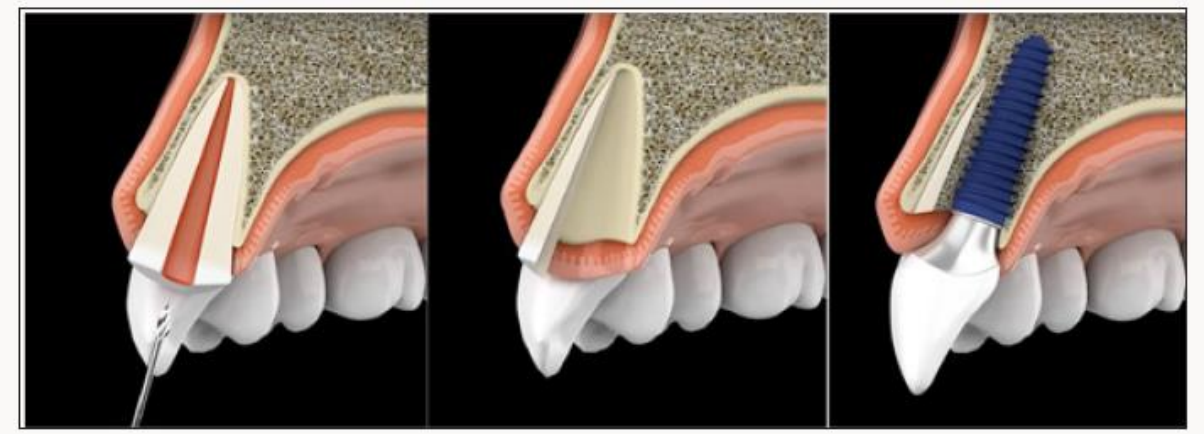
Hurzelar et al (2010) published the success of socket shield technique by partial retention of the roots to preserve the buccal bone. This preservation of buccal bone and ossification of the residual roots was performed in Beagle dogs [(3)].

Benefits of Socket Shield Technique:

There is an increasing frequency in the number of patients who require immediate dental implants in the aesthetic zone. A fully intact buccal bone wall with a thickness greater than 1 millimeter (mm) and a thick gingival biotype are the main requirements to place an immediate implant according to Chappuis et al. (2015). When both of these conditions are present, there is a low recession risk of the buccal gingiva and width reduction of the soft tissue profile at the neck of the implant prosthesis [(1)].

The socket shield technique provides with superior soft tissue and proper bone stability over long term scenario, provides proper aesthetics in anterior aesthetic zone, It is a single surgery not requiring much armamentarium, and substantially reduces the time and cost of treatment by minimizing number of procedures required.

Hurzeler et al (2010) also postulated leaving a 'shield' of root fragment of approximately 1.5mm would leave sufficient space for proper placement of the implant and maintenance of the buccal bone [(4)].



Schematic diagram of socket shield technique

Back as early as 2010, Hurzeler et al. published a proof of concept proposing partial retention of tooth roots in an effort to preserve the important buccal bone. Preservation of bone and ossification between residual roots and surrounding bone. Back as early as 2010, Hurzeler et al. published a proof of concept proposing partial retention of tooth

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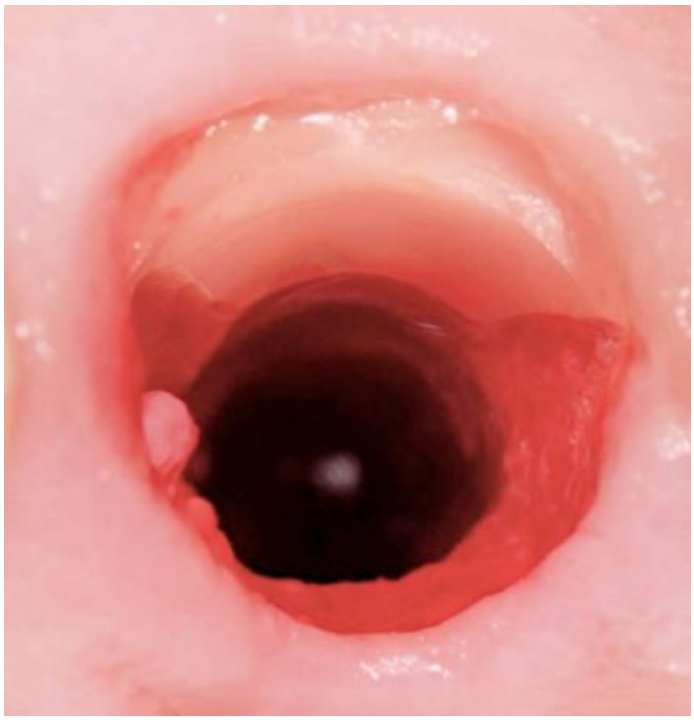

Occlusal view of socket shield (in vivo)

Implant placed palatal to the socket shield

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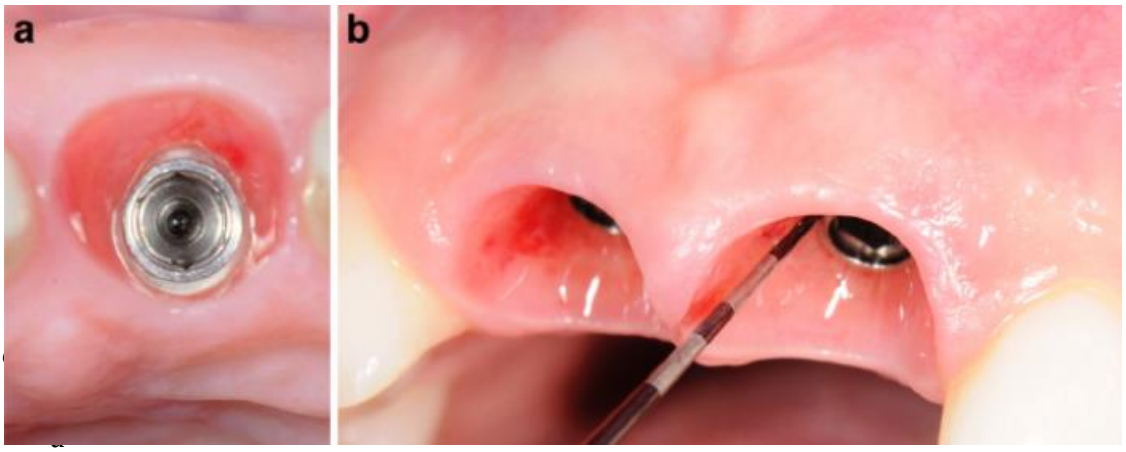

led implant site (occlusal view) b) Healed implant site (emergence profile)

Complications:

The exposure (internal and/or external) of the socket shield as reported by Gluckman et al. [was the most commonly reported complication pertinent to the socket-shield technique with a total of 17 exposed socket shields reported.

The most pertinent complication given by Gluckmen et al was the exposure of the socket shield either internal or external [(3)]. Gluckman et al reported 17 exposed socket shields. He proposed treating the external exposures of the socket shield with a connective tissue graft and the internal exposures by removal of the infected socket shields while retaining the implant. Additionally, other complications reported are the resorption of the socket shield, periimplantitis, non-integration of the implants, or failed implant integration [(3)].

Baumer et al reported volumetric changes in the buccal tissue complex in comparison to conventional implant placement and respective restorative techniques.

Siomparas et al reported radiographic changes affecting the remaining root fragment. Although this cannot be substantiated properly since the buccal volume of bone was assessed on two dimensional radiographs [(1)].

Conclusion:

The socket shield technique does seem to be a good technique in terms of maintenance of alveolar bone, stability of marginal bone and esthetic outcomes in immediate implant treatment. Nevertheless, a lack of consensus not only in surgical technique but also in prosthetic management was observed. Consequently, based on current evidence, it is not possible to recommend this technique as an alternative treatment with the same long-term predictability.

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