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# THE BENEFITS OF USING THE SOCKET SHIELD TECHNIQUE IN PARTIAL EXTRACTION THERAPY: AN ARTICLE REVIEW

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**Abstract:** The technique with socket shield is used like not total extraction therapy which is based on preserving segment from one of the sides on the root from the tooth that is going to be extracted. The main use of this technique is in cases for implant placement that is combined with grafting bone. The goal of this technique is to preserve as much as possible tissue from the periodontal ligament and also to spare the gingival tissue from unnecessary damaging during the therapy.

Indications for this technique are : 1. To support and to preserve buccofacial bone part of extraction socket in cases that require immediate implants.2. Socket shield technique is indicated in cases with vertical fractures of teeth that are without any pathology of the pulpal tissue, where the bone tissue sparing and also attractive look are a main goal.3. To preserve the papilla between the placed dental implants.

In spite of that to have a full success of this therapy is required to have enough bone tissue that will allow stability of the future implant and also absence of any kind of infection. The advantages from application of this technique are many, such as prevention from resorption of the lamellar bone, high aesthetics results, improved primary stability of the future implant, minimal invasiveness during the procedure, prevention from forming a connective tissue with the implant, low cost compared with other procedures etc. There are also disadvantages such as possibility of displacement of the buccal lamellar bone. The purpose of this study is to analyze the efficiency of this socket shield approach in immediate implant treatment. This study was based on Narrative review on published surveys, using PubMed, Medscape, Webmd, Mdconsult, Emedicine data bases. The preservation of the whole attachment apparatus of the tooth to maintain complete preservation of the alveolar bone tissue, makes the socket shield approach a very good technique that results with high level efficiency. The clinical outcomes from different studies is believed for this technique to be the best approach for alveolar ridge sparing in the future and also to use as less material as possible.

*Keywords: Socket-shield technique, bone grafting, immediate implant, partial extraction, bone preservation.*

## INTRODUCTION

The partial extraction therapy is advanced surgical procedure which is used to establish protective socket wall. The socket shield technique is type of partial extraction therapy which is based on preserving a thin segment from the one site from the tooth's root which is being extracted. Preserving the segment of the root also allows preservation of the periodontal ligament that connects the root with the bone, meanwhile the bone and the gingival tissue on it are being spared too. This technique is mostly used for placing implants right after extraction in combination with bone grafting in the space between implant and root segment of the tooth that is being extracted.

Hurzeler et al. first explained about this technique in year 2010 that is good approach to prevent bone ridge loss after extraction, in combination with implant placement ( Hürzeler, 2010).

This therapy technique is very effective when the aim is preserving the bone and gums tissue if the required conditions are met, such as absence of any kind of infection and sufficient bone tissue for primary stability of future implant.

The socket shield approach most often is used in cases that require immediate implant placement of tooth that needs to be extracted, mostly in the upper jaw. The crown is reduced 1mm above crest, the root is split longitudinally into two halves. The palatal root part is examined carefully and if it is not healthy it is removed. Then the facial part gets concave form with a drill. After that an implant is being placed and if there is need, a bone graft material can be inserted inside. (Sáez-Alcaide, 2021)

Advantages

- Helps to preserve the bone structures and prevents the resorption of the lamellar bone.

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- Smaller amount of material is used
- The aesthetics are kept on high level.
- Helps in placing the implants in the correct position.
- Complete osteointegration can be achieved with thistechnique.
- Prevents formation of fibrous tissue around the future implant.
- This treatment is with lower cost but very effective.
- This technique requires minimal level of invasiveness in the procedure.

Disadvantages and limitations

- Resorption of the bone may be found in patients with periodontal infection and inflammation.
- This approach is very sensitive for patients.
- There is a possibility of displacement of the lamellar bone.
- Long term consequences are not known for now.

Instruments that are used for this technique are: drill longer than the standard ones, for canal resection; extra long drill with diamond head; gums protector; surgical engine with irrigation system; micro periotome; micro forceps; instruments for alveolar wall construction; grafting instruments; SM 69 scalpel;6/0 nonresorbable surgical thread for stitches.

**Purpose**: The purpose of this work is to assess the efficiency and benefits of the socket shield approach in patients that need immediate treatment with implants.

## MATERIALS AND METHODS

This study was based on narrative analysis on articles in English language, that have gathered results that are in relation to the socket shield technique. The survey was conducted in the period of four months, from March 2021 to July 2021. The wideresearch was made using PubMed, Medscape, Webmd, Mdconsult, Emedicine. The search was done by using terms as: partial extraction therapy, extraction alveola preservation, tooth sparing and socket shield. In this assessment were included clinical studies, case reports, systematic reviews and qualitative studies. The survey was conducted with online research of the above-mentioned data bases by both authors, with discussion about selection of the articles, all articles were screened, while the studies that met the correct subject were analyzed in details. The criteria was based: socket shield technique principles, benefits from partial extraction therapy, the usage of socket shield approach, advantages in the treatment with immediate implants using this technique. From the total number of 95 articles that were found by searching the keywords, 28 articles were taken for further analysis, containing information about the implementation of the socket shield approach and the advantages of this therapy.

## DISCUSSION

The extraction of teeth is followed by the normal reactive behavior of the alveolar bone known as resorption, in various degrees. The alveolar bone tissue under the tooth is mostly having vascularisation from the periodontal space. If the vascularization of the alveolar bone is not enough, it can cause total or partial resorption of it (Staehler, 2020). Bone resorption approximately is being estimated in width of 50% or 3.8 mm. However the process of resorption is very different in every case individually. As a consequence, mostly approximately 1% of the whole bone tissue of the alveolar ridge is resorbed after the process of tooth extraction (Gluckman, 2020). The use of preventive tissue techniques after tooth extraction was tested for their contributions in some clinical works. Filippi, et al. were investigating about sparing root of vital or avital and it was concluded that if the root is saved and the crown is removed, the bone resorption will be smaller before placing an implant.

Andersson, et al. (2003) conducted studies which have shown that if the root is kept, the alveolar bone is being less resorbed and also there is an influence on the process of the vertical growth of the bone tissue, as an occurrence that has been found in vivo in patients. Another study performed by Bjorn O. et al. has shown that in some cases it was found a new tissue of cementum and a connective tissue placed on the upper surface of the roots that were spared during this procedure.

The preservation of the whole attachment apparatus of the tooth to maintain complete preservation of the alveolar bone, makes socket shield approach a very practical procedure. Before performing the procedure, anamnesis, clinical evaluation and diagnosis must be done, and also the bone should be estimated. That is why for every patient it is good to make an individual plan for the treatment.

Tarnow et al. stated that it is required to have at least 3 mm distance between the implant and the rest of the teeth to have an ideal interdental papilla.

From the reported results found by Hürzeler(2010) et al. it was shown that if part of the buccal side of the root is spared during the procedure, and implant is placed, after that the following osseointegration will be efficient and without big resorption of the bone tissue. That is why socket shield approach is preferably used in cases where it is needed to reduce complications after the implant placement.

When the socket – shield approach is used, it has to be considered that there are two protocols that can be used, first if the implantation is immediate, it needs to be used bone graft to fill the space between the implant and the bone, or if the procedure is delayed, there will need to be more surgical procedures for correction of the bone defect on the alveolar ridge that will be done.

To partly compensate the following defect, there can be used guided bone regeneration and tissue augmentation. In some studies it was found that as a result of this process there can be partly reducement in the bone tissue, however also there are big chances for other complications such as infections in the post operative period and in some cases even a total nonsuccess can be expected.

After many years, in the first case where this technique has been used in 2010 is seen a huge progress compared with the approaches in the 1950s which were used for bone preserving during a tooth extraction.

The implementation of these techniques mostly has been with the aim to keep the volume of the bone after extractions in patients with total dental prosthesis.

With this technique the tooth is being reduced in his crown part in the level of 1 mm above the bone crest in order to keep the collagen fibers and the connective tissue. However, by using of this technique unfortunately the inter dental bone can not be spared from resorption and also the interdental papillae. Hürzeler et al. have found that after the healing process, there were no inflammatory consequences and the attachment was kept well.

In the buccal part of the bone there wasn't any osteoclastic activity, whish shows that the bone tissue was not remodeled, and also if was free of any inflammation.

In their conclusion, it was stated that the osteointegration process was successful and using this technique and the clinical results were good considering the aesthetics.

However, by now it was concluded that total preservation of the bone tissue and the other tissues can not be achieved by using this or any other known technique so far.

Chen et al. have made success with this approach, with bone resorption of only 0,72 mm. However, for this technique to be applied as everyday standard procedure and practice, there need to be done more long term studies for a longer periods in the future.

We may highlight the fact that using of this technique many times can result in serious consequences such as displacing the fragment of the root or affecting the bone. During this procedure, there needs to be paid attention to the cutting of the root that needs to be done vertically, and to be careful to not punctuate the mucosa.

Anyway, it is supposed to achieve for the implant to be surrounded on all its' sides with bone, because according to the current principles of osseointegration (Schwimer,2019), for successful outcome the implant must have a total contact only with bone tissue, without any other. Because the time that these cases were followed is short, still there can not be gathered enough information about the long term consequences of this technique.

In some cases, there can be formed periodontal membrane between the implant and the bone tissue, as a result from the existing gap.

As many clinicians have found that this approach allows protection of the alveolar bone volume and retention of the implant, still in the future new studies should pay attention to inventing or modifying this technique with lower costs and with other materials. Also it should be considered if the sparing the part of the root of the tooth is a good idea, or does it make harm with bone resorption on a long term.

## CONCLUSION

The partial extraction therapy is improved procedure used in the latest years which provides protective socket wall. The socket-shield technique is type of extraction therapy based on leaving thin segment from the buccal site of the root on the tooth that is being extracted. This technique is mostly used for immediate implant placement combined with bone graft appliance in the space between the implant and the root segment of the extracted tooth.

The usage of this technique has shown regeneration of alveolar bone around endodontic treated teeth reported a a presence of formed cementum tissue on the upper surface on the roots. Also it was showed that there is osseointegration without resorption of the alveolar bone. The socket-shield technique was found to be the most practical solution for managing the postextraction changes and the complications associated with the immediate implant placement. It also provides high level of aesthetics if it's used in the front area teeth.

The clinical outcomes from different studies showed that this technique is considered to be good method for keeping the bone tissue, and also to use less material as collagen compared to other techniques. Still many studies in the future are expected to give us more results on the evaluated subject.

**Conflict of interests**

The author declares no conflict of interest.

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