

Treatment of Generalized Aggressive Periodontitis with Guided Tissue Regeneration and Bone Grafting: A Systematic Review

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Abstract

This study is to see periodontal regeneration with guided tissue regeneration (GTR) and bone graft techniques in the treatment of a generalized aggressive periodontitis (GAgP) patient. Electronic PubMed and Wiley searches were conducted to identify articles from 2013-2017 about GAgP treatment with GTR and bone graft. After the selection of articles, 195 articles were obtained but only 5 articles were included. The initial database search produced 195 relevant titles. All articles were selected for full-text review. A total 5 articles were selected for inclusion with 37 patient as subjects. From the 5 studies, three articles used bone graft, and one uses the combination of the two techniques. GAgP treatment with GTR and bone graft showed similar results. From these 5 articles, it is found that both techniques showed a good result in periodontal regeneration, and there is no significant difference between the two techniques.

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Introduction

Aggressive periodontitis (AP) is one of the types of periodontal disease that effects systematically individuals less than 35 years old, but some patients may be older. AP is divided into two subgroups; localized aggressive periodontitis (LAGP) and generalized aggressive periodontitis (GAgP). These subgroups are based on clinical, radiographic, and historical data. GAgP is characterized by generalized interproximal attachment loss affecting at least three permanent teeth other than first molars and incisors.^{1,2,3,4} Patients with GAgP exhibited acute inflammation of the tissue often observed as proliferating, ulcerated, and red. Sometimes bleeding on probing occurs spontaneously, and also suppuration, and causes a destruction of attachment and bone loss.²

Treatment of GAgP consists of non-surgical and surgical therapy. In nonsurgical therapy, we can use certain antibiotics (ex.

Amoxicillin combined with metronidazole) for initial phase after scaling and root planning.^{3,5} After initial phase, residual calculus still remains and requires further surgical therapy.^{5,6}

Surgical therapy includes flap surgeries and regenerative procedures. For regenerative procedures, there are many techniques that can be used to resolve intrabony defects in GAgP patients. Many different techniques such as bone grafting, guided tissue regeneration (GTR) using a membrane, biologic modifiers or the combinations of it. The success of this surgical therapy has considered the anatomy of the defect (number of wall).^{5,6} This articles shows us the periodontal regeneration in GAgP after regenerative procedures using GTR and bone graft.

Methods

This systematic review followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) guidelines.⁷ The PICO question (population, intervention, control, outcome)⁸ is: Population: patients with GAgP disease; Intervention: flap operation procedures; Control: periodontal treatment technique; Outcome: PD/CAL/BOP/PI, So the PICO question is in GAgP patient, does periodontal treatment technique can improve periodontal regeneration (PD/CAL/BOP/PI).

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Search Strategy

An electronic search was performed interrogating electronic databases (Pubmed, Wiley). The searches were performed articles from 2013 to 2017 focusing the treatment of GAgP with GTR and bone graft. The Mesh keywords used were “aggressive periodontitis” AND “guided tissue regeneration” AND “bone grafting”. The search limit to the electronic search was the English language, search period, and type of text. A manual search was performed afterwards. There are 195 studies explained about this, with only 5 articles were included.

Eligibility Criteria

The inclusion criteria was article in English that were published from January 2007 to December 2017, all articles must contain human participants and be followed by a regenerative therapy procedure using GTR and bone graft. The exclusion criteria includes article not in English, no mention about technique GTR and bone graft, and animal studies.

Selection of Study

Specific keywords were used by two participating authors (SU and MA) resulted in the selection of the articles based on the reading of

abstracts and full texts. The two investigators selected the articles based in inclusion criteria formerly set. All abstracts and full texts were downloaded and individually evaluated afterwards. The eligibility criteria were used to identify the articles that will be used for this systematic review.

Extraction of Data

The data was obtained by reviewers that related following parameters: year of publication; surgical therapy with GTR and bone graft of GAgP patient; and objective. All of the full-texts which included were read by reviewers, and evaluated to process this systematic review.

Results

The initial search obtained 195 articles were identified from Wiley and Pubmed Figure 1. After the evaluation of abstracts, 30 full-texts were obtained. Finally, 23 articles were excluded because they did not meet the inclusion criteria. The titles and abstracts were reviewed afterwards and 7 articles were obtained. The full-texts were then reviewed by the investigators and obtained 5 studies that met the inclusion criteria.

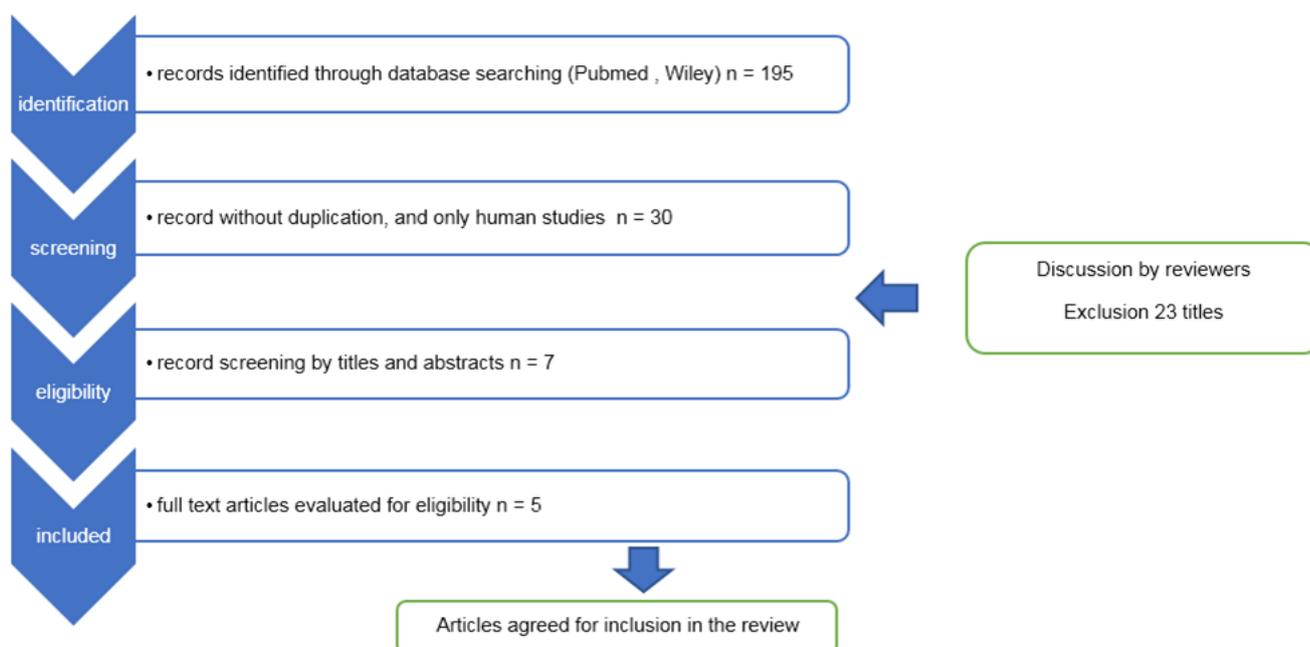


Figure 1. Article Selection Flow Chart.

Author And Year	Type of Study	Geographic Region	Number of Patients	Age of patient	Treatment	Follow Up	Baseline	Outcome
Robert. G 2012	Case report	Colorado	1	27	Bone graft (DFDBA)	12 years	PD/CAL: 5 – 8 mm PI: 59% effectiveness BOP: 60% interproximal sites	CAL gain and PD 2mm PI: > 85% effective No BOP
Roshna 2012	Case series	India	1	32	Bone graft (BB)	6 months	Not mention	Reduction in probing depths to normal levels
			1	26	GTR(CM)+HA)	6 months	Not mention	
Artzi 2015	Retrospective study	Israel	32	14-25	G1:GTR(CM/DBX) G2:Bone graft (EMD/DBX)	1 year	G1:PD:8.93±1.14mm CAL:9.0±1.0mm G2:PD:8.77±1.04mm CAL:8.79±1.04mm	G1:PD:3.5±0.5mm CAL:4.1±0.5mm G2:PD:3.61±0.36mm CAL:3.77±0.22mm
Sangeeta 2010	Case report	India	1	33	Bone graft (AB)	1 year	PD: 7.5±0.7	PD reduce to 2 and 1.5 mm
Kai Fang 2015	Case report	Taiwan	1	29	Bone graft (DFDBA)	5 years	PD:3,8±2,0mm CAL:5,8±2,3mm PI:76,1% BOP:20,6%	PD:2,7±0,7mm CAL:5,6±1,8mm PI:12,1% BOP:6,7%

DFDBA:demineralized freeze-dried bone allograft, BB:bovine bone, CM:collagen membrane, HA:hydroxyapatite, DBX:deproteinized bone xenograft, EMD:enamel matrix derivate, AB:autogenous bone.

Table 1. General Characteristic of the Included Studies.

A summary of the study characteristics are presented in Table 1. Of the included studies, three were case reports,^{9,10,11} one was a case series,³ and one was a retrospective study¹². Three articles were using bone graft, one article used GTR and one article used the two technique. The follow-up period varied from 6 months to 12 years. Patients ranged between 14 to 33 years old.

Robert G,⁹ Sangeeta,¹⁰ and Kai Fang¹¹ were using bone graft in the treatment of generalized aggressive periodontitis patients, and Roshna³ used GTR, and Artzi¹² were used the two techniques. Generally, the included case report described an improvement in clinical parameters using bone graft, as well as the included case series and retrospective study using both of GTR and bone graft. According to Rakmanee,¹³ after surgical therapy, the factors that influence the clinical outcomes is the oral hygiene of the patients during the healing period.

Discussion

Periodontal disease is a dental and oral disease which is most commonly found in humans, caused by several factors, one of which is the accumulation of bacterial plaque. *A. actinomycetemcomitans* is pathogenic bacteria that frequently causes periodontal disease.¹⁴ GAgP is one of the periodontal disease that results in early tooth loss. Proper initial therapy and good oral hygiene is considered for

successful periodontal therapy.¹¹ The articles included in this systematic review have evaluated the effects of a number biomaterials on periodontal regeneration, such as deproteinized freeze-dried bone, BB, Collagen membrane, HA, deproteinized bone xenograft, EMD, and autogenous bone. These biomaterials were used following treatment protocols.^{1,6,10,11,12} Bone graft and GTR are the preferred technique for successful treatment of GAgP. Bone graft is the most widely used treatment option for periodontal osseous defects. Considering that most GAgP patients are young, bone graft is a good choice and some patients preferred allograft as the regenerative materials.^{10,11} GTR (membranes) are used to influence the ingrowth of different tissues into intrabony defects, so that cells from the periodontal ligament are allowed to grow into the defect, resulting in periodontal regeneration.⁵ The Mengel et al.¹⁵ comparative study on 12 patients with GAgP treated with membrane and allograft, said that both treatments resulted in a significant changes in PD and CAL. Bone graft is indicated for vertical defects and it is dependent on the type of the defect. The three-walled or intrabony defect is the ideal defect when using bone graft compared to a two or one-walled defect. One of the allografts used for periodontal regeneration is demineralized freeze-dried bone allograft (DFDBA). The osteoinductive properties of the DFDBA has made it the ideal graft compared to alloplastic which is osteoconductive.³ The successful healing in periodontal regenerative

procedures requires stability in the wound and good revascularization. Besides that, flap management, proper surgical techniques, and the patient become a key factor.¹²

Conclusion

This articles emphasize that treatment GAgP with GTR and bone graft shows very good results in periodontal regeneration. This articles suggest a favourable clinical outcome with the use of GTR and bone graft in terms of improvements in periodontal probing depths, probing attachment levels, reduction bleeding on probing and plaque index. However, the success of this treatment should be followed by a good periodontal maintenance. The limitation of this systematic review is that the included articles reported varied follow-up periods. Further investigation and clinical studies are required to formulating better management protocols in the treatment of generalized aggressive periodontitis (GAgP).

Declaration of Interest

The authors report no conflict of interest and the article is not funded or supported by any research grant.

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