

**D**ear Editor,  
 We have read with great interest the article published in the August 2017 edition of the journal, titled "Current-Evidence on the Socket-Shield Technique: A Systematic Review." The article appears to present the technique mostly in a negative light, supported by a review of the literature that in its selection of content and methodology is fraught with error.

The authors claim to have conducted this systematic review "in line with the recommendations of the PRISMA statement." Of the 23 studies (although 2 are listed twice) tabulated by the authors to review "complications and adverse effects," 4 are not the socket shield (Parlar et al, 2005; Guirado et al, 2016; Troiano et al, 2014; Chen & Chen, 2016), 3 are misrepresented as adverse effects (Hurzeler et al, 2010; Cherel & Etienne, 2014; Mitsias et al, 2015) and 11 of the remaining 16 reported no complications. Of the 5 studies tabulated for complications, 4 reported bone loss within the expected parameters for immediate implant placement. One study reported loss of 1 socket shield among 16 patients, and another study reported a probing depth of 8 mm at 1 among 23 socket shields. How authors Gharpure and Bhatavadekar concluded this review with "evidence indicates rapid bone loss, failure of osseointegration . . . weakens the biologic plausibility of this technique" is problematic. As such, we address hereafter our concerns with this systematic review, applying the journal's guidelines for authorship as well as the PRISMA statement to this article.

Regrettably, this article lacks scientific rigor. The authors state, "The objective of this systematic review was to assess the literature available on the socket-shield technique and weigh its biological plausibility and long-term clinical prognosis". The first step of a systematic review is to frame the research question, yet a clear unambiguous question is not framed. Rather, an "objective" is proposed. The authors thereafter duly identified eligible literature resources, namely, "a PubMed-Medline, Embase, Web of Knowledge, Google Scholar and Cochrane Central [for clinical/animal studies] up to April 2017." The authors state eligibility criteria for reviewed articles, and herein lies the greatest error. "Studies were included if . . . implants are placed in close proximity to or in contact with root fragments which are intentionally retained to preserve or promote buccal/proximal/crestal bone". Exclusion criteria were studies (1) in which root fragments were not left back intentionally to preserve or promote buccal/proximal/crestal bone and (2) in which implants were unknowingly placed in proximity or in contact with retained roots. Throughout the article is evidence that this eligibility was not adhered to.

1. We note the section "Study Characteristics and Outcomes" and Table 1
  - The review refers to Parlar et al (2005).
  - They state, "Parlar et al were the first to place 18

implants in the center of prepared hollow chambers of decoronated roots having slits at the periphery in nine mongrel dogs."

- Parlar and coworkers never intended to evaluate bone preservation as a function of retaining hollowed-out tooth roots and placing the implants within the center of a tooth root chamber.
  - The article by Parlar et al reads, "The purpose of this study was to explore the formation of periodontal tissues around titanium implants using a novel and unique experimental model." Also, "This study aimed to investigate the possibility of formation of cementum and periodontal ligament on titanium surfaces in a novel experimental model in which the priority of repopulation on titanium surface is given to periodontal ligament cells."
  - There is no evidence that the aim of Parlar and coworkers was to evaluate bone preservation using the socket-shield technique.
  - Ergo, this review article includes literature not meeting the inclusion criteria.
  - Moreover, these data had been combined with other animal histologic studies in Table 2 and erroneously combines these to draw conclusions on "total complications and adverse effects."
  - It is possible the authors may not understand what the socket shield is. Oversimplified, it is a "partial extraction therapy," a retained buccal/facial root portion at immediate implant placement, first reported by Hurzeler et al in 2010. It is not a hollowed-out chamber of tooth into the center of which an implant is placed.
2. Again, we note the section "Study Characteristics and Outcomes" and Table 1.
    - Here, a study by Troiano et al (2014) is cited.
    - Here, the review process is again in error by including this article, which does not meet the selection criteria.
    - Troiano et al did not evaluate the socket-shield technique. As with the experimental failure by Parlar et al (2005) to place implants wholly within the hollowed-out tooth root chambers, Troiano et al placed implants inside tooth roots. This is not the socket-shield technique.
  3. Again, we note the section "Study Characteristics and Outcomes" and Table 1.
    - Here, a study by Guirado et al (2016) is cited.
    - Again, an article not meeting the selection criteria is included.
    - Guirado et al placed implants wholly inside the center of teeth in 6 dogs. Their study did not evaluate the socket-shield technique. As with previous studies, dating as far back as Buser et al (1990), placing dental implants inside tooth roots consistently fails to achieve osseointegration.
  4. Readers of this review may be misled by overstating the extent of bone loss resulting from the socket shield (Table 1). First, the bone loss referred to is not exclusively

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attributed to studies of the socket shield but rather to entirely different procedures, as stated above. Moreover, it is now well established in the literature that approximately 2 mm of crestal bone loss should be anticipated following immediate implant placement. In fact, according to Chappuis et al (2013), 7.5 mm of vertical bone loss is to be expected at the maxillary central incisors in thin-wall phenotypes. Throughout the review, the results for bone resorption are reported as follows:

- "Abadzhiev et al, 2014; Mean crestal bone loss 0.8 mm"
  - "Chen & Pan, 2013; Mean buccal bone loss 0.72 mm"
  - "Siormpas et al, 2014; Mean crestal bone loss  $0.18 \pm 0.09$  mm mesial  $0.21 \pm 0.09$  mm palatal"
  - "Baumer et al, 2015; Mean buccal bone loss 0.88 mm Range - 1.67 mm to 0.15 mm"
  - In addition, an article by Siormpas et al (2014) is cited, with 5 years of follow-up data, as having adverse effects. Siormpas et al reported 1 in 46 patients to have 1.5-mm root resorption, with no other signs/symptoms in any of the cases.
  - Abitbol et al (2016) reported increased probing depth (8 mm) in 1 of 23 socket shields reported.
  - Lagas et al (2015) reported loss of 1 socket shield among 16 patients, and this implant was still restored with positive outcomes reported.
  - A further 11 articles are nominated in Table 1 to conversely have "no adverse effects."
  - The review tabulates results from incongruent articles, reporting on techniques that are not the socket shield and inaccurately presents interpretation of these to overstate the extent of bone loss, when, contrary to established literature, all the results fared better in terms of bone loss than conventional immediate placement.
5. We note Table 1 and the reference to Cherel and Ettiene (2014).
- First, this was not the socket-shield technique. The article clearly describes a case report of an entirely different modification, similar to Joseph Kan's report in 2013.
  - Visibility of the root fragment when the interim crown was removed is tabulated in the review as an "adverse effect."
  - Bone materials are frequently visible within the soft tissue of the biological zone where augmentation was carried out and an implant crown is removed. In these authors' case report, the appearance of the proximal root fragment through the soft tissue in the biological zone when the interim restoration was removed was noted. It was never reported as an adverse effect.
6. Again, we note Table 2 and the reference to Mitsias et al (2015).
- At 3 years of follow-up, the implant was probed, with a 4-mm measurement noted at 1 site.
  - It is well known that probing around implants is not comparable to probing around teeth in terms of diagnostic accuracy, and there is no congruency in the literature regarding this.
  - Moreover, the original article never reported this as an "adverse effect."

7. The review authors state, "loss of the socket-shield either by resorption or due to extraction following infection, may lead to loss of the bone it preserves and may predispose the implant surface to exposure." Yet there is no evidence of this in the literature. If the review can justify this statement, a reference to data of the socket shield undergoing root resorption facial to an implant and the implant being exposed must be provided.

There are numerous, additional errors that may be brought to the readers' attention, but all follow the same fundamental problem with this article: not meeting the stipulated eligibility criteria for review. The review strays from the main aim and does not speak to the primary objective of assessing "long-term prognosis and biological viability" of the technique. Biological viability is almost entirely omitted from this review.

As readers appraising this article, the section "All the clinical studies discussed (except Abadzhiev et al.) are case-reports, each with their own sets of methodologies and parameters for assessment making comparisons of outcomes difficult. As a result only 5 studies could be included for the modified ARRIVE quality analysis," is equally problematic. The ARRIVE guidelines are for animal research exclusively. The acronym stands for Animal Research: Reporting of In Vivo Experiments. This review can apply the guidelines only to the 5 animal research studies cited. It is misleading that "all the clinical studies," the majority of which are human case reports, fail to meet guidelines exclusive to animal research.

To conclude, we welcome the open, scientific discourse on these new techniques. It will bolster and galvanize newly introduced ideas, as they follow the course of their natural selection and progression. Those fraught with complication, poor success, and so forth will disappear, and ultimately techniques proving positive to both clinician and patient will naturally develop, be revised, and thrive.

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