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Research Article

PRF FOR SCHNEIDERIAN PERFORATION REPAIR

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Abstract:

*Sinus lift procedure is a safe and predictable technique, but some complications such as a perforation of the Schneiderian membrane (SM) still occur. Therefore, the question how to treat such complication is quite a relevant one. **MATERIAL AND METHODS.** The analysis of the specialized literature in the electronic databases PubMed, Web of Science, Scopus on "Schneiderian membrane perforation", "Schneiderian membrane" and "PRF" was done. **RESULTS.** Predisposing factors for sinus lift perforation are discussed and the way of its treatment is represented. **CONCLUSION.** There are factors predisposing to Schneiderian membrane perforation that we cannot influence and have to deal with. L-PRF membrane can be used to close sinus membrane perforations with quite a predictable result alone. L-PRF membrane can be used to reinforce the sealing obtained by the collagen membrane. Xenograft can be used with i-PRF/AFG to make the whole graft more stable and easier to handle. I-PRF/AFG can be utilized to seal micro perforations that can be left unnoticed otherwise.*

Key words: Schneiderian membrane perforation, sinus-lift, sticky-bone, PRF

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INTRODUCTION:

Dental implantology has gained wide popularity over the last three decades as an effective and time-tested way for dental rehabilitation among partially or completely edentulous patients. However, in many cases, vertical bone height is limited in the posterior maxilla. To overcome this challenge sinus floor elevation or sinus lift procedures have been developed. Access to the sinus membrane can be accomplished by the preparation of an osteotomy in the lateral sinus wall as described by Boyne and James [1] and studied by Tatum [2] or by a trans-crestal approach as described by Summers [3]. In both methods' xenograft is usually put into subantral cavity to increase secondary stability [4]

Sinus lift procedure is a safe and predictable technique, but some complications may still occur, such as postoperative wound infection, maxillary sinusitis development, loss of the graft material, edema, bleeding, and perforation of the Schneiderian membrane (SM) [5].

Schneiderian membrane perforation is the most common intraoperative complication especially when burs are used, with a frequency of 3–56% [6]. Thus, such questions as how should we treat such complications if we have to and how can we decrease it are quite relevant.

MATERIAL AND METHODS:

The analysis of the specialized literature in the electronic databases PubMed, Web of Science, Scopus on “Schneiderian membrane perforation”, “Schneiderian membrane” and “PRF” was done.

RESULTS AND DISCUSSION:

Risk factors for membrane perforations

As it has been shown by Pinto et al. [6] frequency of Schneiderian membrane perforation varies very much in literature: from 3 to 56 %. That is why we first decided to analyze risk factors for this complication. To begin with, it was shown by Wallace et al. [7] that rotatory instruments have higher (30%) perforation rate compared to ultrasonic instrumentation (7%). This item can easily be influenced by us among good 3D roentgen preoperative visualization way and manner of the elevation, though there are lots of other factors that depend only on patients anatomy, way of life and so on. Sinus septa (28.4%) have been reported as the most frequent contributing factor [8, 9].

Park et al. [10] showed that Schneiderian membrane was significantly thicker in patients with perforation compared to the patients without perforation ($P <$

0.001), though in the cases without pathosis, there was no significant association between membrane perforation and Schneiderian membrane thickness ($P > 0.05$). This can be explained by the fact that the presence of pathosis and sinus membrane thickening can lead to a poorer membrane vasculature, secondary necrosis, and poorer elasticity of the membrane, as thick Schneiderian membranes do not have a higher resistance under elastic forces [11]. No correlation between the size of the perforation and the thickness of the Schneiderian membrane as well as the location of Schneiderian membrane perforation and the size of perforation was found. There is no significant difference between the frequency of smoking and the presence of systemic diseases in patients with or without sinus perforation [10] though Monje et al. [12] even in the lack of statistical significance found a near-trend significance. Thus, smoker individuals may possess thicker Schneiderian membranes compared to non-smokers. In the meta-regression analysis [12] the correlation between age and SM thickness had a positive tendency with the exception of one study though being not significant.

SM thickness does not seem to be homogeneous throughout the sinus cavity [13] being the thinnest in the lateral wall and having the thickest measurements in the mid-sagittal deepest sinus position [14].

To close, or not to close, that is the question

Though it was shown by Park et al. [10] that minimal postoperative complications can be achieved even after unrepaired membrane perforations, traditionally several ways to repair the membrane depending on its location and dimension established. There are Loma Linda Pouch method, when the whole sinus is covered with a collagen membrane and the graft material is positioned in the center of the membrane, modified method, when a collagen membrane is located only on the surface of the Schneiderian membrane [15]. For small perforations (less than 5 mm) a folding technique has also been suggested [15].

The way PRF can contribute

Platelet rich fibrin (PRF) is a second-generation mesh made of concentrated autologous platelets consisting of leukocytes and cytokines that is quite a simple low-cost and effective procedure to put into practice due to centrifuge use [16]. It activates the vascular system and angiogenesis, releasing growth factors involved in soft and hard tissue healing. In addition to the positive effect on soft and hard tissue healing, PRF can be used for its antihemorrhagic effects. These effects are important in reducing edema after surgery [17].

Although L-PRF can be used in sinus lift augmentation alone, it was shown that the use of bone grafts remains much more predictable than the use of L-PRF alone but adding L-PRF leads to faster bone graft maturation [18] though some authors stay skeptic [19].

L-PRF membrane was proposed to reinforce the sealing obtained by the collagen membrane when closing big perforations [6]. Furthermore, liquid form, i.e i-PRF or AFG (Autologous fibrin glue), can be utilized to seal microperforations that can be left unnoticed [15].

AFG is also used to get so called “sticky-bone” that is quite easy to handle and what is really important holds the whole bone mass as a coagulum not letting xenograft particles to go to sinus cavity through perforated membrane [20].

CONCLUSION:

1. There are factors predisposing to Schneiderian perforation that we cannot influence and have to deal with.
2. L-PRF membrane can be used to close sinus membrane perforations with quite a predictable result alone.
3. L-PRF membrane can be used to reinforce the sealing obtained by the collagen membrane.
4. Xenograft can be used with i-PRF/AFG to make the whole graft more stable and easier to handle.
5. i-PRF/AFG can be utilized to seal microperforations that can be left unnoticed otherwise.

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