R.T.R.+ in practice: Managing the extraction socket

Pierre Koumi shares a dental practice with his colleagues in Brussels, where they specialise in periodontology and implantology, so this was the perfect environment to get feedback on the use of the innovative R.T.R.+ formula, a synthetic bone substitute made from tricalcium phosphate (ß-TCP) and hydroxyapatite (HA). During our interview, we also spoke about the challenges in dentistry and the importance of patient education.

Why did you choose to specialise in periodontology and implantology?

For me, dentistry is a real crossroads of several different aspects: intellectual, manual, scientific, medical, human, artistic and creative.

Before specialising in periodontology and implantology, I worked for 8-9 years as a general practitioner, which I call **"Comprehensive Dentistry"**, which allowed me to have an overall, critical view of dentistry. This is an essential base to analyse complex cases, which often require a multidisciplinary approach. I am also lucky enough to work with colleagues who share the same passion and conviction as me, which has allowed us to progress and to learn from each other, which plays an important part in us feeling fulfilled professionally.

I am particularly passionate about the surgical aspect of periodontology because that allows me to use creativity, based on rigorous scientific and medical principles, to work with living human tissue and to rebuild lost tissue, which is simply magical.[1]

Each intervention is a challenge that relies on the practitioner and their skill but also depends on the patient and their specific

physiology and their cooperation. I also enjoy the educational aspect with my patients, to raise their awareness about periodontal disease, which patients often don't know about, or underestimate how serious it can be.

I love sharing my experience with my colleagues and learning from their criticism, comments, and their specialities. It is a profession that keeps changing, and we need to keep learning all the time…

What are the challenges you face, and how do you prepare for the future?

The time of the pandemic made us think about our weaknesses in the face of nature. Covid alerted us to our daily practice, which is extremely high-risk. **The challenge is treating our patients in record time, with a surgical intervention which is as non-invasive as possible** in order to limit the complications and reduce post-operative recovery, as well as the risk of contamination. This goes alongside advances in IT technology, which allows us to plan more and more cases virtually, preparing the different kinds of surgical guide matrices in advance (implant surgery guide, a matrix in the form of a grid or metal post for bone grafts…), or digital imprints, this can reduce the number of surgical stages or operating time, and thus reduces post-operative complications and even the risk of contamination.

In which situations do you use an R.T.R.+ solution?

R.T.R.+ is a synthetic biomaterial, made from hydroxyapatite and beta-tricalcium phosphate (ß-TCP), which are used as bone substitutes to fill in or reconstruct the bone, thus acting as a bone graft.

There are different kinds of bone grafts: autografts (autogenous bone from the patient), allografts (bone from cadavers), xenografts (bone from another species, bovine or porcine…), and alloplastic grafts (synthetic grafts).

All these filling materials have different properties on bone formation:
- osteogenic properties (living osteocytes present in the material),
- osteoinductive properties (stimulates bone formation through the activation of the differentiation of mesenchymal cells into osteoprogenitor cells),
- osteoconductive cells (the material plays a role that supports bone formation).

Their physicochemical properties (resorbable or not, porosity…) will also influence the behaviour of osteogenic cells.

R.T.R.+ is an osteoconductive biomaterial, so it will play a part in supporting bone formation to a predefined limit. For me, the indications are the management of the extraction socket, bone regeneration, which is guided in horizontal and vertical bone increase, bone grafts under the sinus membrane (sinus lift), filling cystic cavities, filling in bone craters in periodontology and implantology.

"R.T.R.+ is an osteoconductive material, and plays a part in supporting bone formation to a predefined volume."

Why do you choose tricalcium phosphate (ß-TCP) and/or hydroxyapatite?

We choose hydroxyapatite because it is an osteoconductive biomaterial that is not resorbed, or only very, very slowly. This will give the bone cells enough time to form in sufficient volume, maintained by the hydroxyapatites. However, the ß-TCP particles, which also play an osteoconductive role, are resorbed gradually, soon leaving room for the bone to form, and in theory, it will lead to a bone graft that is richer in living bone cells. **I think that it is an original idea to combine the 2 products, as I believe this will give a bone graft with a higher percentage of living bone** than if we just use hydroxyapatites… this could be the subject of a comparative study.

a. When do you decide to use the 80/20 formula (more ß-TCP than hydroxyapatite)
In cases where the volume that we want to fill will not undergo a significant structural change (cystic cavity, intra-osseous periodontal or implant craterisation).

b. When do you decide that it is better to use the 40/60 formula (more hydroxyapatite than ß-TCP)
In cases where the volume that we want to fill could undergo rapid structural changes due to its nature, such as the extraction socket, or due to its function, like the sinus and its Schneider membrane, which is constantly under pneumatic pressure.

In the case of sinus lifts, I prefer biomaterials that are not resorbed quickly, which will also hold the sinus membrane in place and thus allow time for osteogenesis.

What were your first impressions when you used R.T.R.+?

I still haven't had enough time to use this product, but my first impressions are rather positive. For example, in one of the clinical cases where I performed guided bone regeneration (GBR) in a horizontal bone graft, to widen the ridge and place the implant in the ideal prosthetic position, I used R.T.R.+ mixed with drilling auto bone generator to increase the osteogenic potential through vascular supply from the drill holes and through living osteocytes in the recovered bone boring. Then I covered and stabilised the mixture of RTR+ and bone boring with a membrane of resorbable collagen.

After 6 months of healing, I opened the site in order to position the implant. My first impression was very positive, the graft had taken very well, despite the presence of a few grains of R.T.R.+ which were still visible on the bone surface, but attached and fixed to the bone, without being surrounded by and isolated from the bone. I think that this is a product that deserves a comparative scientific study more detailed than just a "clinical impression".

Moreover, the fact that R.T.R.+ is 100% synthetic reassures patients regarding the risk of contamination.

Pierre Koumi

He was awarded his master's degree in dental sciences from the University of Brussels (ULB), where he also specialised in periodontology and implantology. At the University of New York, he followed the "Linhart International Continuing Dental Education", a two-year dental course entitled "Current Concepts in American Dentistry, Advances in Implantology and Periodontics". He was hired by the University of New York as international program director for Belgium. He joined the University of Liege (ULG) in Belgium for a further two-year training course and obtained his European Inter-university Certificate of competence in implantology. He runs a private practice focusing on periodontics and implant surgery in Brussels, Belgium.

A CLINICAL CASE on managing the extraction socket with R.T.R.+ and a connective tissue graft

Author : Pierre Koumi

Introduction

Any dental extraction brings about inevitable tissue alterations (soft and hard tissues). These alterations often result in bone loss after extraction of 20% to 60% in volume horizontally and 11% and 20% vertically. [1]

So, this bone loss is massive and can reach 50% of the volume if we allow healing to take place spontaneously without the addition of biomaterials, which complicates the three-dimensional positioning of the implant and making the prosthesis.

Studies show that the use of low bone resorption biomaterials associated with atraumatic surgery (extraction without flap) and the use of collagen matrices could reduce this bone loss by up to 10-15%, which would allow optimal positioning of the implant in the second surgical phase [2].

Other studies [3] show that the use of an osteoconductive material with a low resorption rate and the application of a connective graft over the socket could reduce horizontal and vertical bone resorption even further and thus compensate for this bone loss by a thickening of the soft tissues, which would facilitate the optimal placement of the implant and give an aesthetic gingival contour without loss of volume, which would improve the emergence profile of the crown. This is the technique described in this clinical case with the use of R.T.R.+ (80/20 formula) and connective tissue.

The presence of this connective tissue will ensure that the R.T.R.+ will stay in place, and more importantly, it will compensate in vestibular terms for the loss of volume of soft tissue which occurs despite filling.

Clinical case

54-year-old patient in good general health. The request was both aesthetic and functional and she presented with a gingival smile and a root fracture of tooth 21.

This clinical case took place in 2021 and used the R.T.R.+ 80/20 formula. The fitting of the implant is due to take place in January 2022, around 6 months later.

Tooth 21 cracked with a periapical lesion: requiring a treatment plan that consists in extracting tooth 21 and replacing it with an implant.

Sources
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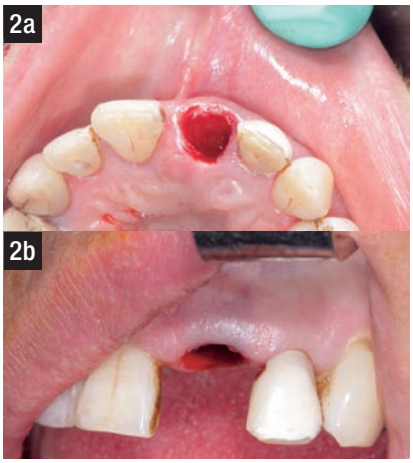
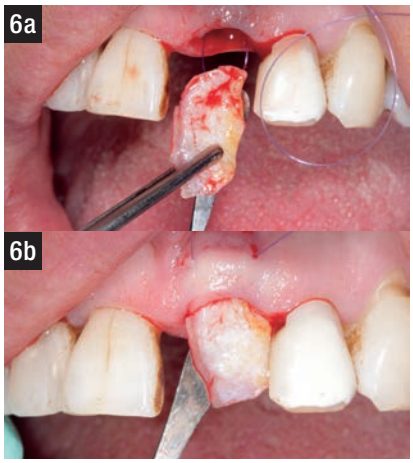


Atraumatic extraction without flaps, in order to preserve the vascularisation of the socket bone as much as possible

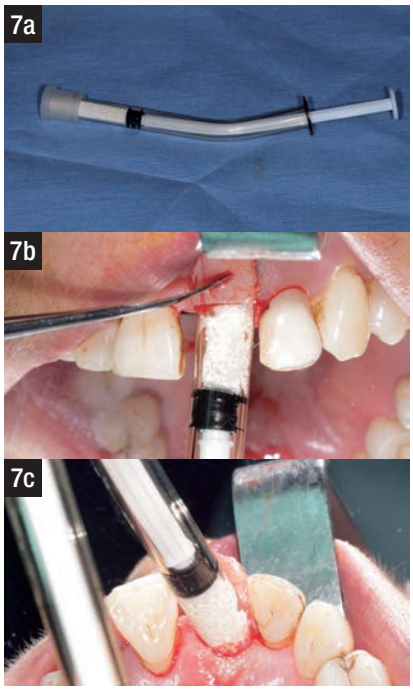
Sample of soft tissue from the palate

Preparation of a half-thickness 'pocket' to house the connective tissue graft

The graft will be placed with its two edges in the pockets prepared in the vestibular and palate areas

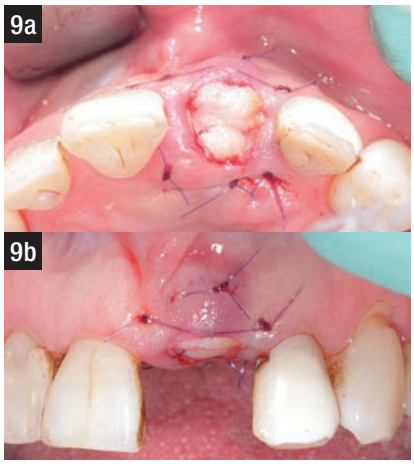


Suture of the graft after having slid it into the vestibular pocket



Preparation of the syringe (by aspirating a little of the patient's serum and blood) and filling the extraction socket with R.T.R.+

R.T.R.+ in place



Suture of the other side of the connective tissue graft on the palate

Expected resorption times