YUSUF ALSHAFI
Yusuf is an implant dentist at 31 Harley Street. His passion and special interest in dental implants started soon after graduating from Guy's, King's and St Thomas' Dental Institute in 2007 and has continued with the completion of an MSc in implants in 2018. He was a senior house officer at Guy's Hospital in oral surgery and restorative dentistry and completed examinations for Membership of the Faculty of Dental Surgeons, at the Royal College of Surgeons, Edinburgh.
Over the years, he has completed numerous postgraduate courses in implant dentistry in the UK, US and Europe. As a result, he has experience in the most advanced dental implant treatments and the latest techniques. Yusuf accepts referrals for implant treatment.

Grafting techniques in implant dentistry have evolved over the years, but the fundamentals are the same.

For predictable outcomes, it is important to have an adequate blood supply to the grafted area as well as a stable, non-mobile graft.

Care must be taken to not sever blood supply when preparing the surgical flap and thought must be given to ensure the patient's blood flow hasn't been restricted due to an increase in viscosity (eg, in smokers).

The healing nature of the blood is mainly driven by the platelets, which – apart from helping to form a plug in haemostasis – modulate tissue inflammation and regeneration.

This is done by the release of growth factors, cytokines and extracellular matrix that then promote revascularisation and restoration of the damaged tissue.

Understanding the function of platelets can allow us to appreciate the benefits of increasing their concentration in our surgical sites.

WOUND HEALING

Platelet-rich plasma (PRP) has been used by our medical colleagues for decades – often injected into traumatised or arthritic joints to help improve healing, or in the treatment of ulcers and burns to help promote wound healing.

Traditional methods have anticoagulants in the test tubes when blood is drawn from the patient and, because of this, there was a lack of fibrin in these preparations. However, drawing the blood into test tubes that contain no anticoagulant results in a higher concentration of fibrin, creating what is commonly known as platelet-rich fibrin (PRF).

Fibrin is a fibrous non-globular protein, which is formed by the breakdown of fibrinogen by thrombin (a clotting enzyme). These form long threads that entangle the platelets, gradually hardening and contracting to form the clot.

Fibrin is also a reservoir for growth factors, it induces vascularisation and positively induces osseointegration. Therefore, we can significantly improve the healing of surgical sites by increasing the concentration of fibrin, in addition to the platelets.

PROTOCOL

The protocol is as follows: find a suitable vein to draw the patient's blood – ideally from the antecubital fossa so that the flow is fast enough that the blood does not clot in the test tube.

To separate the red blood cells, the test tubes should then be spun in a centrifuge according to Dr Joseph Choukroun's protocols – 1,300rpm for 14 minutes.

At the end of the spin cycle, blood collected in the red A-PRF test tubes will have a yellow clot at the top of the tube, which is the PRF. This can be removed with tweezers and placed into the PRF box and then compressed to a thin membrane (Figure 5), expelling the liquid into the base of the PRF box.

Blood collected in the green S-PRF tubes will be spun in the same way and at the same time as the A-PRF tubes.

It will also produce the separated yellow platelets at the top of the tubes, but these will still be in liquid form (non-clotted).

This part should be drawn out using a 2ml syringe; part of this liquid is mixed with the graft material and the other part is placed into a dish to create a larger PRF membrane.

This will usually take a number of hours to clot, but the process is sped up by using the liquid exudate from the A-PRF membranes (in the base of the PRF box). Once the A-PRF liquid is added to the S-PRF liquid, this will then clot in a matter of minutes.

The liquid PRF mixed with the bone graft material produces the 'sticky bone'. Once it has clotted, it allows the graft to be carried to the recipient site in one piece (Figure 7).

Yusuf Alshafi discusses enhancing bone grafting with 'sticky bone' and platelet rich fibrin

Improving bone grafting

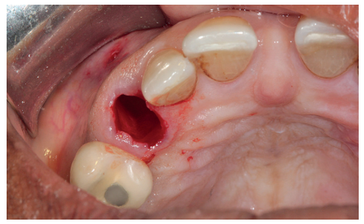

FIGURE 1: *Socket post-extraction. Socket shield treatment attempted due to the thin bundle bone overlying the root, but abandoned due to mobility of the root*

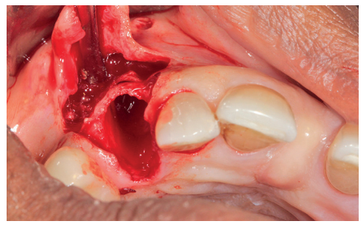

FIGURE 4: *Coronal view of the thin buccal bone*

FIGURE 6: *S-PRF liquid drawn out of the test tubes and placed into the preparation dish. The allograft was added to the smaller one and allowed to hydrate. The larger area was used to create a large membrane to wrap the graft. Exudate from the base of the box that was used in A-PRF membranes (Figure 5) was added to help accelerate the clotting*

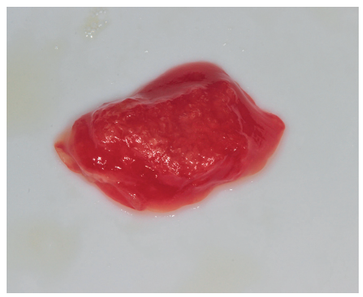

FIGURE 9: *Wrapped. Allograft/PRF mix in a large PRF membrane*

FIGURE 2: *Preop CBCT, confirming thin buccal bone (bundle bone) overlying UR3*

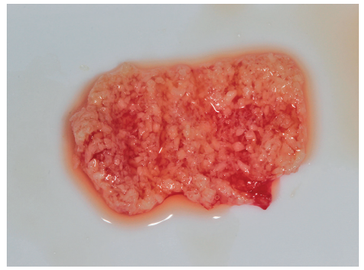

FIGURE 7: *Sticky bone – liquid PRF and allograft (Biohorizons Mineross). All the allograft is stuck together and can be carried with tweezers, meaning there is no risk of migration of graft where it is placed*

FIGURE 10: *A Megagen Anyridge 4.0 x 13mm implant was placed according to immediate placement protocols with a healing abutment. A resorbable collagen membrane (Biogide) pinned on the buccal aspect ready for the graft to be placed into the jump gap and over the buccal bundle bone*

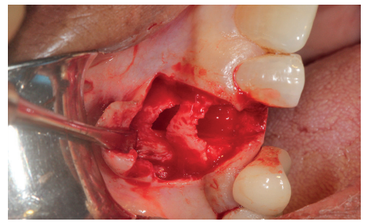

FIGURE 3: *Flap elevation to expose the bone, fenestration present. The coronal part of the bone will resorb since the PDL fibres have been severed*

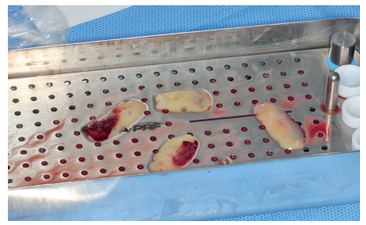

FIGURE 5: *Preparation of the A-PRF into membranes*

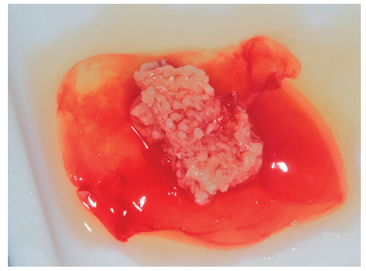

FIGURE 8: *Placing the sticky bone into the larger PRF membrane (Figure 6) to wrap it further in platelets and fibrin*

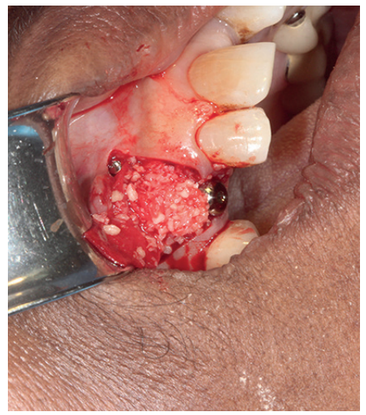

FIGURE 11: *Sticky bone graft placed under and over the bundle bone*

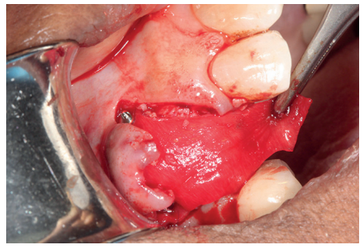

FIGURE 12: *Stretching the collagen membrane over the graft and secured palatally*

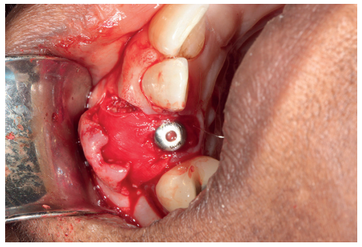

FIGURE 13: *Collagen membrane secured palatally and with the healing abutment*

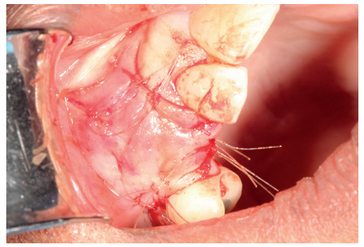

FIGURE 14: *Tension-free closure following periosteal release of the buccal flap with aid of apical mattress, horizontal mattress and single interrupted sutures (Monocryl 6/0)*

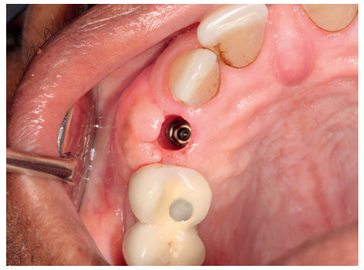

FIGURE 15: *Healing after three months, ready for impression*

FIGURE 16: *Final crown to replace UR3 showing favourable gingival height position and papilla*

FIGURE 17: *Palatal view (mirrored) showing the bucco-palatal profile has been maintained*

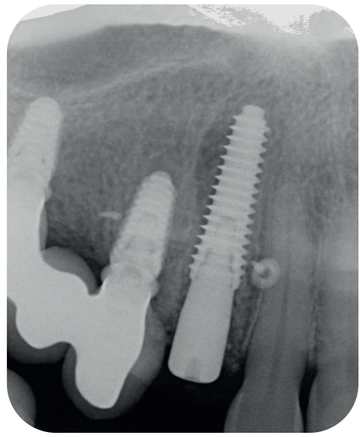

FIGURE 18: *Immediate postop radiograph following implant placement and graft*

This can also be wrapped in the larger S-PRF membrane that has been produced in the white tray (Figures 8 and 9). The increase in the fibrin concentration can further increase the rigidness and stability.

INDICATIONS

Indications for use of these A-PRF membranes include packing them into sockets to reduce the chances of alveolar osteitis (dry socket).

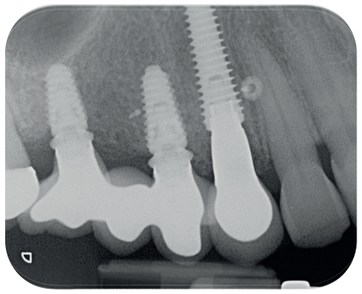

FIGURE 19: *Radiograph following restoration with definitive crown*

This ‘super-clot’ creates the right conditions in the socket for bone formation deeper in the socket and keratinised tissue formation superficially

This ‘super-clot’ helps to prevent food trap into the socket, but more importantly creates the right conditions in the socket for bone formation deeper in the socket and keratinised tissue formation superficially.

These membranes can also be cut into small pieces and mixed with the bone graft material, to increase the concentration of growth factors within the graft and also bulk up the amount of material that is available. This is especially helpful in lateral window sinus augmentations.

It can be helpful to place a healing abutment through these PRF membranes in what has been referred to as a ‘poncho technique’.

This can help to easily create a seal around implants, especially in immediate cases where it fills the space between the extraction socket and the healing abutment.

The PRF membrane can also be used to fill into a narrow ‘jump gap’ rather than using a graft material, especially where packing the granules into that space will prove difficult.

Another advantage of having PRF during sinus lift surgery is to place these membranes against the Schneiderian to act as a protective layer against this fragile tissue, even where there have been small tears.

When performing internal sinus lifts, I also find these PRF membranes useful, as packing them into the osteotomy and filling the space around the tip of the implant has little risk, compared to packing a graft material in where there may have been an undetected Schneiderian tear. This is, of course, in cases where only a minimal gain in height is planned.

In situations where there is a need for greater height gain, or even in a lateral window situation and for any kind of guided bone regeneration, the ‘sticky bone’ technique can be very helpful.

In the sinus, this makes it less likely for the granules to escape into an unidentified tear through the Schneiderian.

In guided bone regeneration, for example in the case of a buccal bone graft, using ‘sticky bone’ can increase the chances of attaining a stable non-mobile graft, which means it is more likely to be a successful regeneration.

Of course, where there are large grafts, a collagen membrane should be utilised (ideally tacked into placed), or a rigid membrane (eg, cytoplast or titanium mesh) to further stabilise/enhance the graft where appropriate.

STABILISING THE GRAFT

The point of using the ‘sticky bone’ concept is to help stabilise the graft further.

I find this especially important during the actual transfer of the graft material into the site and shaping it into position, where often it will distort and move out of place.

When using ‘sticky bone’, you can be sure it will be where you place it, making the whole process less stressful and more predictable.

Closure of the surgical wound is paramount to the healing of any graft, and apical horizontal mattress sutures are recommended to prevent and tension in the flap margins.

This is similar to a standard horizontal mattress suture, but the first and last bite of the suture is taken 1cm from the buccal margin, where sufficient periosteal release has been first undertaken.

This then allows the close adaptation of the buccal flap, bringing it all coronal and maintaining the tension at the point of this apical suture.

Further horizontal and vertical mattress sutures, as well as continuous locking or single interrupted sutures, are completed to finish.

There are many other uses for PRF that are beyond the scope of this article. These include: placement of PRF over palatal connective tissue donor sites and placement into infrabony defects in periodontal treatment; and in liquid form: injected into the scalp to enhance hair growth and in facial aesthetics, commonly known as a vampire facelift.

PRF is an incredible, inexpensive autogenous material that is easy to harvest and prepare, and has almost zero side effects to patients.

PRODUCTS USED

Anyridge Megagen
Biogide Geistlich
Mineross Biohorizons
Monocryl 6/0 Ethicon