Horizontal bone augmentation

Dr Riz Syed discusses the importance of general bone augmentation in the arena of implantology and some treatment options

Dental implants require sufficient bone to be adequately stabilised. For some patients, implant treatment would not be an option without horizontal or vertical bone augmentation. Therefore, general bone augmentation is an area of immense importance in implantology.

A variety of materials and surgical techniques are available for bone augmentation, depending on the case and patient — after all, each case is different.

One option is a block graft, a bone augmentation technique ideally suited for simply building up bone matter. Firstly, the area to be augmented is measured and then cortical blocks are harvested from either the chin or the ramus of the mandible. First the area to be augmented is measured. After raising a flap from the donor site, a block is cut either by using peizo-surgical instrument or by drilling small holes to trace the outline of the block. A fissure bur then links these and the block is separated from the underlying bone using chisels.

The donor site can be filled with collagen sponges to aid healing, before being sutured. On the host site, the cortical plate is perforated numerous times to promote bleeding using small diamond burs. The block is then shaped using large burs to fill the void and follow the curve of the dip. Small holes are drilled through the block and the cortical plate to allow for a screw to secure the block in place.

Particulate bone can be used around the block and a resorbable membrane draped over the graft. This is left for at least six months before implant placement.

Non-resorbable membranes

A more tricky technique is to use non-resorbable membranes to build up the bone mass. The use of these membranes is technically sensitive and in inexperienced hands can easily lead to failures, resulting in the removal of grafts.

Generally there are two types of commonly used membranes. One of which is titanium reinforced, while the other is not. In areas of augmentation, xenografts alone with these membranes cannot be used. In my experience, although the ridge will augment, the quality of bone formed is very poor and unsuitable for implant placement.

It is therefore important to mix autogenous bone and xenografts together with an equal ratio to achieve better results. The autogenous bone can be taken from the tuberosity or ramus and crushed.
using a bone mill. Safe scrapers can also be used to harvest a large volume of autogenous bone.

The host site is prepared in the same way as for the block graft by perforating the cortical plate. The bone is placed over the void and covered. The membrane is then cut into the desired shape and tacked into position. This stage is very important to prevent movement and exposure.

A tension-free flap is then sutured over the graft, and left to heal for at least six months before the membrane is removed – a vital stage in all augmentation cases. The peristium at the base of the flap can be scored using a scalpel to allow for greater flexibility.

Alternatively, ridge augmentation can also be achieved using resorbable membranes. An example would be a severely atrophic posterior ridge. Once the cortical plate is perforated, a mixture of autogenous bone and particulate bovine bone can be mixed and placed onto the atrophic ridge. A resorbable membrane can then be secured over the augmented area and left for a period of six months.

**Demineralised Bone Matrix**

A relatively new concept to enter the arena is the use of Demineralised Bone Matrix (DBM). Already used by some colleagues in the US, this technique has been approved by the American Food and Drug Association, but is still waiting to be approved in the UK.

This is human cadaver bone prepared in such a way that growth factors are released to aid augmentation. The bone comes in a putty form and is therefore very easy to use, simply mixed with autogenous bone, usually taken with bone scrapers or blocks, and crushed in a bone mill. In large defects, the cortical bed is further prepared by small perforations. Tenting screws are then placed to achieve the correct dimensions, before the putty bone is moulded in position and covered with a resorbable membrane. The area is sutured over using a tension free flap and allowed to heal for at least six months, after which the screws are removed and implants placed in this newly augmented bone bed.

Ridge splitting is a technique that allows the surgeon to open a thin ridge by cutting into the coronal portion of the cortical plate and gently widening the ridge using progressively larger sized instruments into the slit ridge. Implants are then placed, and the void filled with a bone matrix. This technique, although effective, can also lead to varying degrees of resorption.

A number of options are outlined in this column and all are very effective depending on case selection and surgical skills. Training courses are available on hard tissue augmentation.