Implant modelling

Part I.

In daily dental practice we are often confronted with the problem not being able to meet the right expectations of our patients due to insufficiently stabile or too few tooth abutments which frequently prevents the production of a fixed or properly functioning removable denture.

The clinician can also feel very discouraged by a disappointed patient and failure.

Nowadays, the rapid advance in implant materials, their physical properties, designs, surface finishing and the operational technique of their insertion on one hand give hope edentulous patients and on the other hand the practitioner can also raise high hopes for a properly functioning denture. There is no better feeling for the dentist in the world than a patient who is satisfied with the services.

Tooth implantation requires best professional preparation and a thorough knowledge of the implant system to be used.

Of course, prior to every operational treatment the professional protocols for implant surgery, such as general indications for the implant insertion and the correct assessment of contraindications must be accomplished.

If there is no general contraindication, we can start planning the denture that comes nearest to the dental record and we can use even implants for stabilisation of the abutments.

Today panoramic radiographs and various ball-bearing or other radiographic guides are

Fig 1.

Fig 2.

Fig 3.

Fig 4.

Fig 5.

Fig 6.

commonly used and with their help the clinician tries to transfer the implant position from the radiograph to the edentulous jaw.

We must admit that it is too little information because the panoramic image is twodimensional and full of bone projections.

Since the dentist knows nothing about the coronal section of the bone and the bone density either, he is confronted with the real anatomic relationships only after exploration so he often is able to place the implants only in sites and angulations which significantly differ from those planned earlier. If using panoramic radiograph the true spatial position of the canalis mandibulae in coronal direction cannot be determined that is why the implant might be ruled out due to contraindication.

It is unnecessary to observe that an operation is successful only if the implants are stabile but with improper position and axis

Fig 7.

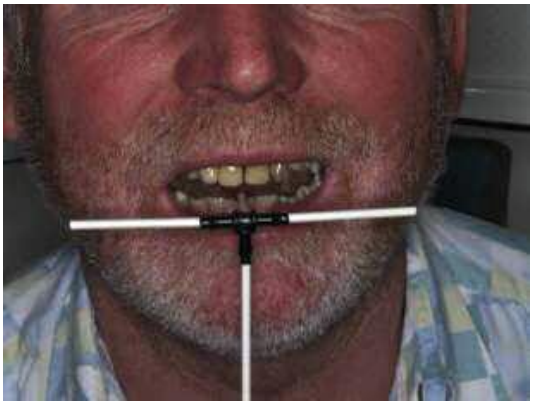

Fig 8.

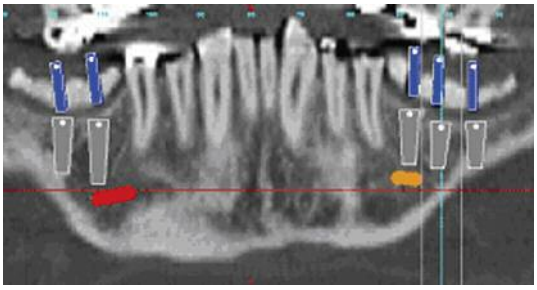

Fig 9.

even most experienced dental technicians will feel completely confused to achieve ideal aesthetics and occlusion in majority of the cases.

The launch of CBCT (Cone Beam Computer Tomography) revolutionised diagnostics since modern devices nowadays do not provide the findings on film but on CD along with a utility program enabling dentists to create sections wherever they want.

Of course, this wonderful system cannot solve the problem how to transfer what we saw to the conditions in life and where in the space a certain anatomic formula actually is.

To be able to transfer the site, depth and angulation of the planned implant to the edentulous jaw we have to apply one more system consisting of 3D implant planning software and a special milling machine.

The milling machine has two functions. First the CT guide is manufactured with it which allows transferring the metric points to the plaster model and we can produce the surgical guide in relation to them.

Planning starts with upper and lower impression takings and occlusion fixing.

If there is no group of teeth to determine the central close bite we ask the laboratory for a record base.

The CT guide is prepared according to the antagonist relations and bite height on which the laboratory replaces the artificial teeth with a special X-ray absorbing material above the planned implants (Fig. 1, 2, 3, 4).

When model and CT guide were returned to the office the model must be shaped so that it always can be reinserted in the same position in the milling machine.

Once fixed it in the milling machine we adjust the position of the plaster model with a laser beam more precisely and we reset all of the values at 0 (Fig. 5, 6).

According to the mounting of teeth and the shape of the edentulous crest we look for the most ideal sites on the CT guide and drill parallel holes in it for every implant we are planning to insert (Fig. 7).

These bores will be the reference marks for the software that calculates the real values for all implants (Fig. 9).

We take the picture with help of the CT guide always controlling its accurate fitting on the mucous membrane of the edentulous jaw (Fig. 8).

We should pay attention to the possibility of metal containing dentures in antagonist teeth and in order to reduce the number of artefacts the guide should be lifted by 5 to 10 mm so that they do not hinder us from CT assessing and planning.

Later on we import the DICOM images of the CT unit into the IMPLA3D program where the actual planning can begin (Fig. 9).

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