The advent of CAD/CAM technology and the more widespread utilisation of implants in modern dentistry has led to an explosion of treatment solutions designed to address any situation encountered by the general dentist.

As patients have become more aware of the benefits of implant therapy, they have begun to demand more immediate restoration of their teeth. The provision of a fixed prosthesis has also been the goal in dentistry; however, the cost of such treatment is pricing the vast majority of patients out of the implant market. Immediate loading, avoiding conventional grafting techniques by placing implants at various angulations (All-on-4, Nobel Biocare; Columbus Bridge, Branemark III), has resulted in a significant uptake of treatment by edentulous patients and those with a failing dentition. This is mainly because a fixed bridge is provided and treatment times are reduced from months to hours, avoiding a conventional denture.

Most edentulous patients can tolerate a complete maxillary denture with few problems. The vast majority of problems arise in the mandible, where the underlying supporting tissues are not designed to function under this type of occlusal loading. Even a properly constructed complete lower denture can move as little as 6 mm under this type of occlusal loading. In addition, mandibular teeth are subjected to more retromolar destruction than their maxillary counterparts. The push to place more implants into the jaw has addressed the need to support large superstructures. The advent of CAD/CAM technology and the more widespread utilisation of implants has increased the number of prosthetic treatment possibilities available to dentists. The push to place more implants in an attempt to improve the situation led to the bar- and clip-retained overdenture scenario. This technique was more successful but still encountered similar issues to the stud-attachment overdentures.

Improving component manufacturability, and attention to both surgical and prosthetic techniques, and greater care in the design process have increased the utility of this treatment modality. Several attempts have been made to redesign and improve the attachment systems, however, owing to previous negative experiences, most dentists became reluctant to adopt any system. The implant-retained bar overdenture solution allows the fabrication of a true passive-fitting bar and clip system on two or more implants. The push to place more implants in an attempt to improve the situation led to the bar- and clip-retained overdenture scenario. This technique was more successful but still encountered similar issues to the stud-attachment overdentures. Poor stress transmission from the prosthesis to the supporting implants results in bone loss around the implants (especially the most distal implants in the multiple bar scenario), in addition to prosthetic and surgical complications. This resulted in implant companies and clinicians moving away from the two implant-retained overdenture treatment option in favour of fixed solutions, such as round-house bridges fixed on four or more implants. As a result, the vast majority of patients cannot access implant therapy owing to financial constraints. The McGill consensus brought the implant-retained overdenture back into the spotlight as a way of increasing access to implant dentistry and improving patients’ quality of life. Improved component manufacturing techniques, and greater care and attention to both surgical and restorative treatment planning have significantly improved treatment outcomes using overdentures.

Recently Condore-Méixe introduced the Stress Free Implant Bar, or SFI-Bar, to the dental community. This unique, implant-platform-independent restorative bar overdenture solution allows the fabrication of a true passive-fitting bar and clip system on two or more implants. The push to place more implants in an attempt to improve the situation led to the bar- and clip-retained overdenture scenario. This technique was more successful but still encountered similar issues to the stud-attachment overdentures. Poor stress transmission from the prosthesis to the supporting implants results in bone loss around the implants (especially the most distal implants in the multiple bar scenario), in addition to prosthetic and surgical complications. This resulted in implant companies and clinicians moving away from the two implant-retained overdenture treatment option in favour of fixed solutions, such as round-house bridges fixed on four or more implants. As a result, the vast majority of patients cannot access implant therapy owing to financial constraints. The McGill consensus brought the implant-retained overdenture back into the spotlight as a way of increasing access to implant dentistry and improving patients’ quality of life. Improved component manufacturing techniques, and greater care and attention to both surgical and restorative treatment planning have significantly improved treatment outcomes using overdentures.

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The jig is designed to mimic a ball joint connection, ensuring a perfect section each time. The jig slides along the tube bar until it reaches the implant adapter, accurately sizing the bar. The tube bar is then locked in place and cut to size with a cutting disc (Fig. 6c). The process can be carried out either chair side (two-implant bar) or in the laboratory (four-implant bar or large). An implant-level master cast will be required for cutting in the laboratory. The cutting of the tube bar must always be carried out extra- or intra- orally.

Once the tube bar has been cut, the ball joints are inserted into each end of the tube bar prior to seating on the implant adapters (Figs. 7a-d) and torqued into place. The SFI-Bar is now complete and the patient is ready for the retentive element to be housed in the denture. The ball joints can accommodate non-paral- lel implant placement up to a maxi- mum of 15° angulation correction. The absence of any soldered or welded joints means that a greater length of the bar can be engaged by the retentive clip. In conventional implant techniques, the presence of a weld increases the bar thickness, at the point preventing any retentive clip engaging that area. In the SFI-Bar, the clip engages the full length of the bar between the ball joints (Fig. 7). The bar assembly must be parallel with the occlusal plane; therefore, a selection of implant adapters of varying lengths should be available.
denture. This denture functioned without surgical or prosthetic is-
issues for a five-year period. Unfortu-
nately, the patient revisited her
denturist and complications arose
after an attempted intra-oral relin-
ching procedure. On examination, it
was determined that the ball abut-
ments were too large and needed to
be replaced. The female hous-
ings needed to be replaced, as they
were no longer seated properly on
the ball abutments.

The patient was then given the
option of having either another ball-
abutment-retained overdenture or
a bar-clip-retained overdenture
instead. The patient opted for the bar and clip overdenture. The first step was to
remove the damaged ball abutments and seat the appropriate
implant adapters on each implant
(FH adapters of 4 mm in length; Figs. 4a & b). The tube bar was then
inserted into the cutting tool and cut
to correct length using the cutting
disc (Fig. 14). After blocking
assembly was then connected to the implant
adapters and torqued into place. The
universal nature of the bar joint
allows the tube bar to be located in the
horizontal plane in a truly stress-
free alignment (Figs. 2a-c & d-b-c).

The implant adapters were cho-
sen so that when the bar is seated it is parallel to the occlusal plane,
with at least 1 mm clearance be-
tween the underside of the bar and
the mucosal tissues (Fig. 1b). This
allows space for effective and hy-
giene procedures around the den-
tal implants and reduces the risk of tissue trauma during bar.i

Bar when the denture is seated. From a surgical perspective, ridge reduc-
tion procedures may be required
firstly to aid implant place-
ment and secondly to ensure that
there is enough space in the fabri-
cated final denture to be seated on
the bar assembly. If multiple implants are used, adapters with a range of
lengths should be used. Multiple
implants are more difficult to place
parallel to each other but the bar
points can accommodate up to 15°
of implant divergence. Implant
comparisons are seen more com-
monly in bar and clip overdentures
than stud-attached overdentures.

Clinically, the whole pro-
cEDURE took six minutes, from remov-
ing the implants to seating the
bar assembly into place.

The bar-attachment retained
denture was then hollowed out so
that it could be seated over the bar
assembly and used as a provisional
while the new definitive denture was
being fabricated. A custom
base tray was made to use a border-
moulded final impression with Im-
pressions (Fig. 10). This is rele-
vant for treatment planning, as ridge
distraction may be indicated to provide
space for the denture.

In the laboratory method, the
denture is completed with the
female part T integrated into the
denture. The dentist then chooses
the level of retention required by
selecting the appropriate plastic
inserts and seating them in part T
(Fig. 11b). The plastic inserts are
designed to compensate for trans-
marginal inaccuracies during the impre-
sion, master cast fabrication and
post-processing stages. The pres-
ence of a laboratory technician is
recommended for the chairside
technique. A spacer is placed on the
tube bar prior to seating the E clip
to ensure vertical resilience. The
spacer ensures a slight gap be-

between the E clip and the tube bar
so that when the patient bites down, the E clip does not overbend or dis-
tort the bar as the denture beds into
the supporting mucosa. All under-
cuts around the bar assembly, espe-
cially between the bar clip and tis-
sues, were blocked out with a sil-
cone material (Fig. 10). A window
was then cut into the lingual aspect
of the denture to expose the E clip.
(Fig. 15a). A small bead of cold-
cure acrylic resin was then placed
on the jig, covering the retention
element of the bar. The E clip was
then attached to the denture with small increments of resin (Fig. 15b). The resin was allowed to cure fully before the denture with the E clip
was removed from the mouth. The
remainder of the void was then
filled with cold-cure resin and al-
loved to cure outside the mouth
(Figs. 15c & d). Ideally, this process
should take place in a pressure pot.

A transfer jig that fits into the
E clip and is effectively a tube bar
cap can be utilised if a large vol-
ume of acrylic has been used to
house the denture. The transfer jig
seated in the E clip is bedded into a
pasty of fast-set plaster, similar to a
denture-repair scenario. Once the
base has set, the denture is placed in a pressure
pot with warm water and the self-
curing resin is allowed to poly-
merise. Once the acrylic has
cured, it is separated from the stone
base and the transfer jig and all
excess acrylic is trimmed.

At least 50 per cent of the lamel-
lae of the E clip must be clear of
resin. Only the superior part of the E clip with the attachment portion
and shoulder section is locked into
acrylic (Fig. 1c). The lamella
must be free to flex over the tube bar
during insertion and removal of the
denture. If the resin is in direct con-
tact with the lamella, the denture
may not seat, as the E clip cannot
be flexed. Finally, the definitive prosthese-
s was seated (Figs. 14a & b).

The level of retention of the
E clip was adjusted using the activa-
tion and deactivation tools provided in
the restorative kit. The occlusion
was checked and adjusted after
verifying that the denture had been
properly seated, using pressure-
indicating paste. The bar assembly is
required to be seated in the
two-implant scenario. Support
does not require additional bar
implants because the bar assembly is
self-curing acrylic resin in the
female part E (made from Elitor—
pressing will result in a bar that is
not true passive fit when the bar is assem-
bled. The finite element analysis clearly shows the stress-free nature of
the bar when being assembled and when the prosthetic experi-
ences loading (Figs. 2a-c).

No laboratory time is required to
fabricate the bar and there are no
costly implant components or gold-
ally charges. Clinically, there is
no need for the bar sections to be sol-
dered in an attempt to achieve pas-
sive fit—a step that may need re-
peating—as with the conventional method.

There are no soldered or laser-
welded joints. The bar assembly has
no inherent weak points that may
fracture or corrode. The bar is
assembled in the patient’s mouth, who
also attaches the E clip intra-oral-
ly. The reduced number of clinical ap-
pointments, laboratory time and cost
results in reduced treatment costs for
the patient. In the case presented, for
example, the bar assembly was completed in
only six minutes. This is approxi-
ately the same time it takes for
a polyether impression material (like Impregum) to set!

Conclusion

The SH Bar is relatively inex-
ensive compared with conven-
tional gold castings and CAD/CAM
tech-
niques. The overall cost of the pros-
thesis and treatment time are sig-
nificantly reduced compared with
conventional and CAD/CAM tech-
niques. Precision-milled compo-
ents provide an improved quality
of fit. The physical and mechanical
properties of the component mate-
rials can be controlled accurately, which is not possible with con-
ventional casting methods. The SHI-
Bar can be used to fabricate im-
plants to create a full-bar or bar
needed, while the SHI-Bar system provides an immediate fit, passively as a single-piece element. The passive-fit bar assembly can in
greatly reduced stress transmission to the
supporting implants. Studies have
demonstrated that this is also a viable

treatment option for immediate-
loading situations in the mandible,
providing that the implants achieved
insertion torques exceeding 50 Ncm approx-
imately.

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