Managing the failing dentition

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Increasingly, the numbers of patients walking through the doors of our practices are those whose dentition is slowly in decline.

I am presented on a daily basis with patients requiring replacement of missing teeth, restoration of worn and discoloured teeth and those whose teeth are mobile and would like to be able to function adequately.

Often patients are only aware of the localised area of failure and are focused on addressing only that area of their mouth; one or two mobile teeth, one or two spaces that need to be filled, worn and discoloured anterior teeth.

As the experts, it is our responsibility to provide the patient with a solution to their problem that will have longevity, predictability and not accelerate the deterioration of the surrounding dentition and supporting structures.

Longevity and predictability of the treatment arise not only from the restoration itself but also dealing with the cause of the breakdown and deterioration so that the restoration that has been provided for the patient does not fail in the same way as the natural tooth.

This needs to be explained to the patient at the initial consultation so that they can understand why a thorough assessment and diagnosis is required.

In my experience patients invariably agree with the rational and understand that detailed examination is necessary in order to determine the correct treatment plan for them.

This allows for the practice of comprehensive dental treatment and may involve a multidisciplinary approach when necessary.

The role of occlusion

When assessing the mode of failure of any dentition it is advisable to try and determine the root cause of the problem and secondary factors that may be accelerating the loss the loss of teeth, bone or tooth structure.

The roles of caries and periodontal disease in the deterioration of dental health have long been documented.

Although the role of occlusion is loosely recognised by many dentists, little credence is given to it either due to lack of understanding of occlusal factors, lack of knowledge of how to address the treatment and inability to explain this to the patient.

Treatment can often be more extensive if occlusal issues are taken into account (Davies et al 2001; Svanberg et al 1995), therefore better understanding of these factors and treatment modalities is needed.

Occlusal trauma

Primary occlusal trauma results from excessive occlusal forces applied to a tooth or teeth with normal supporting structure.

Secondary occlusal trauma occurs when normal/excessive occlusal forces cause trauma to a tooth or teeth with reduced periodontal support.

Factors precipitating occlusal trauma:

- Increased bite force
- Oversized masseters
- Tendency to clench – relevance to jaw type

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Figure 1: Pre-treatment, smile view.

Figure 2: Pre-treatment, retracted view.

Figure 3: Pre-treatment, central view.

Figure 4: Pre-treatment, right side view.

Figure 5: Pre-treatment, left side view

Figure 6: Pre-treatment, upper occlusal view.

Figure 7: Pre-treatment, lower occlusal view.

Figure 8a: Left lateral excursion.

Figure 8b: Left lateral excursion.

- Habitual bruxism
- Primary occlusal trauma
- Reduced bone support
- Post perio disease
- Secondary occlusal trauma
- Reduced number of teeth
- Shortened dental arch
- Lack of posterior teeth
- Instability
- Premature contact – posterior/ anterior
- Working and non- working side interferences
- Anterior tooth position
- OB – increased / reduced
- Retroclined incisors
- Distalised mandible
- Tooth morphology in relation to envelope of function.

In order to formulate a treatment plan, the reason for the instability/destruction needs to be discovered.

This is carried out by the evaluation of the entire functioning system to determine the modes of failure and assess the risk of future failure.

The box out 'occlusal function checklist' (left) describes the approach, but there are specific parameters to be evaluated, as laid out in Table 1: Establishing a cause of destruction.

In order to show how occlusion can and should incorporated into a restorative treatment plan the case presented here involves a multidisciplinary approach to correct a failing dentition that involves occlusal factors.

Patient case - Adele

Adele's upper dentition had been restored with a combination of crowns and bridges approximately 15 years ago. An implant had been placed in the UL6 approximately 10 years ago.

Occlusal function checklist
✓ Is the occlusion acceptable or unacceptable… if unacceptable then why?
✓ Is the occlusion a contributory factor to the decline of the dentition?
✓ Does the occlusion need to be addressed as part of the restorative treatment?

Table 1: Establishing a cause of destruction.

Parameters for evaluation				
Temporomandibular Joint	**Tooth structure and position**	**Periodontium**	**Muscles of mastication**	**Inter-arch tooth relationship**
Joint sounds	How do the teeth look in the face?	Bone levels around the teeth (compared to the norm for the patient)	Tenderness	Assessment of OVD
Pain	Assessment of the curves of Spee/Monson	Presence of lamina dura	Hypertrophy	ICP/ RCP
Limited opening	Inclination of the teeth	Periodontal ligament space		Skeletal class1,2,3
Deviation on opening and closing	Structural integrity	Gum health		Cross bite
	Shape of the teeth	Gingival biotype		
		Gingival scallop		

Starting two years prior to the current restoration, the upper restorations and teeth began to show signs of failure. Adele had not attended the practice as often as recommended due to the distance she lived from the practice (150 miles).

After clinical examination, the failure list was as follows:

- The crown on the implant in the UL6 position became loose and porcelain fractured from the crown
- The porcelain on the UR1 facial surface fractured (pontic of a three-unit bridge)
- UL4 became mobile and had deep pockets
- UL5 crown was mobile and had pocketing
- Gingival health declined
- Bleeding on probing increased
- Bleeding score was increased
- Pocket depth increased
- BPE scores increased
- Gum recession on certain teeth increased (UL4, LL6, LR6)
- Aesthetics started to decline
- Lower teeth were becoming slightly crowded.

Radiographic findings

- Good bone levels around most teeth and the implant UL6
- Thin lamina dura present in most areas
- Vertical bone loss defects around UL4, UL5, LL6
- Widened periodontal ligaments: UR6, UR3, UR2, UL1, UL2, UL3, LL5, LL7
- Radiolucency In the tooth UL5.

Occlusal findings

- Group function guidance on left excursion, finishing on the UL5 (Figures 8a and 8b)
- Group function guidance on right excursion involving UR1 (Figure 9)
- In right lateral excursion Ul4 and UL5 non-working side interferences – palatal cusps (Figure 10)
- Anterior guidance all on the UR1 (Figures 11a and 11b)
- Functional mobility (fremitus) of upper anterior teeth and left premolars on biting in ICP.

Diagnosis

- Primary and secondary occlusal trauma
- Gingivitis
- Caries
- Localised periodontal pocketing

Prognosis

A prognosis for every individual tooth was needed. The prognosis was given with a view that the tooth was left untreated.

Figure 9: Right lateral excursion.

Figure 10: Non-working side interference.

Figure 11a: Anterior guidance.

Figure 11b: Anterior guidance.

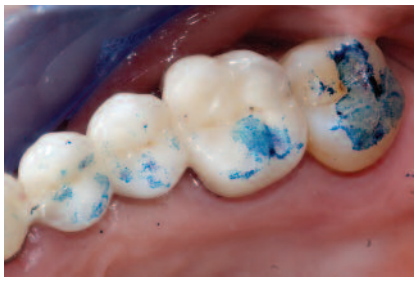

Figure 12: Markings showing heavy occlusal contacts during function on UR7 and UR6.

Figure 13a: Recession around the UL4 relating to the bone loss around the tooth.

Figure 13:

Figure 14: Before treatment.

Figure 15: After lower fixed orthodontics, lower incisor was extracted.

Table 2 details the prognosis for each tooth, with Good prognosis: Teeth with good prognosis were those with good bone support – lamina dura still visible and there was less than 10% bone loss.

Fair prognosis: The LL6 was given a fair prognosis due to the vertical bone loss pattern on the distal side. This tooth was an untreated tooth and therefore healthy. It would be unlikely that this tooth would fail in the future; it could however lose more bone if the trauma (primary occlusal trauma) on the tooth persisted. If the trauma was removed from the tooth and no further bone loss occurred the tooth would have a good prognosis. The periodontal health could be managed.

The UR6 had a narrow area of interproximal bone and significant buccal recession. This tooth was in working and non-working side interference in lateral excursion; primary occlusal trauma. The tooth was also a major retainer for a four-unit bridge. By restoring it as a single unit and reducing the interfering contacts and sharing the lateral load the prognosis of the tooth would improve.

Hopeless prognosis: UR7 had greatly reduced bone support and was therefore subject to secondary occlusal trauma. If this continued the tooth would become more mobile, lose more bone and eventually need extraction.

Extraction of the tooth would have ongoing consequences that could contribute to destabilising the bite. The lower opposing tooth could over erupt, however presence of the UR7 should be taken into account when assessing the prognosis of the UR6. If the UR7 continues to experience more bone loss it could affect the distal bone surrounding the UR6.

Table 2: Prognosis

Prognosis	Untreated	If treated
Good	LR 1 2 3 4 5 6 7 LL 1 2 3 4 5 7 UR 3 2 UL 1 2 3 7 8	LL6 UR6
Fair	LL6 UR6	Presence of lamina dura
Guarded	UR7	UR7
Hopeless	UL4, UL5	(UR7)

The decision was made to retain the tooth for now with regular periodontal maintenance and reduction in occlusal pressure.

The patient also wears a soft night guard to reduce pressure from clenching.

The UL4 and UL5 were deemed hopeless due to the bone loss and mobility around the UL4 and the fracture, caries and heavily restored nature of UL5.

Treatment plan

In order to create a stable dental functioning system with predictability and longevity the causes of the current destruction needed to be removed without creating new modes of accelerated destruction.

The treatment plan was formulated as follows once the diagnosis and prognosis had been discussed with the patient.

- Soft night guard to protect against excessive occlusal forces during sleep. This to be worn during hygiene therapy to reduce inflammation, pocket depth and bleeding
- Hygiene therapy
- OHI
- Mechanical removal of plaque and tartar
- Teeth with hopeless prognosis were left untreated since they were being extracted.
- Orthodontic consultation resulting in the decision to have fixed orthodontics on the lower arch to realign the teeth, alter the inclination to a more favourable stable position, and retract the lower anterior teeth
- Extraction of a lower incisor to create the tooth position and arch form desired. This had been fully discussed with the patient prior to the treatment being carried out.
- Retention of the lower tooth position

Figure 16: Removal of existing restorations.

Figure 17: Refinement of the prepared teeth. Minimal veneer preparation on UL2 and UL3.

Figure 18: Extraction of hopeless teeth.

Figure 19: Provisional Luxatemp bisacryl restorations.

Figure 20a: Definitive restorations UR2-UL3. Provisional PFM four-unit bridge UR6-UR3. Provisional Luxatemp bisacryl bridge from UL6-UL3 (palatal).

Figure 20b

Figure 20c

- Sequential restoration of the upper arch
- Extraction of the hopeless teeth
- Removal of failing restorations.
- Provisional restoration placement with the desired tooth inclination, morphology, length and OVD
- Implant placement in the premolar areas
- Definitive restorations.

Shade and characteristics

After all of the treatment that had been carried out, the final stage was the communication of aesthetics and creating a smile that the patient was happy with from an aesthetic point of view.

The dentofacial appearance of the work carried out also had to be deemed successful for the entire treatment to be a success.

The initial concerns of the patient were the appearance and function (mobile teeth and cracks).

In order to communicate the desired aesthetics, the author's book Creating Smiles was used to communicate shape, texture, translucency, and incisal edge characteristics.

Summary

Lower arch
- Fixed orthodontics
- Lingual retention.

Upper arch
- Extraction UL4, UL5
- Implant placement UR4, UR5, UL4 all with Atlantis abutments
- E.max porcelain crowns UR6– UR3
- E.max Porcelain bridge UR2 – UL1
- E.max veneers UL2, UL3
- Porcelain fused to metal bridge UL4 implant – UL6 implant
- Both UR7 and UL7 unrestored.

General
- Condylar position CR
- No change in OVD
- Provision of a soft night guard if pt clenches in times of stress

Results

The result of the treatment has been:
- An improvement in OHI and gum health - from 58% bleeding score to 10%
- A reduction in pocket depth and BPE score
- A reduction of excessive pressureon the teeth
- Adaptive mobility within normal limits
- Improvement of guidance patterns
- Increased stability of bite
- Improvement of aesthetics.

Adele now has as much improvement in dental health as could be achieved. The improvement in function and aesthetics has increased her confidence both in terms of her tooth structure (not being afraid that teeth will break or fall out) as well as when she communicates with people.

Conclusion

In approaching any dental treatment, the aim should be to improve the patient's dental health. This can also extend to improvement of the physical health and mental wellbeing.

The aim of treatment should be to improve the prognosis of the teeth and related structures and reduce the overall risk of any form of dental disease.

There are certain parameters within which we need to work and there are anatomical constraints that we cannot escape.

We can do our best for the patient in ensuring that the treatment plans we offer and the subsequent treatment we deliver creates a stable, functional and aesthetic end point.

The human body continues to change and adapt, we need to try and maintain any deterioration or adaptation of the dental functioning system within normal limits and not be the cause of its acceleration.

By adopting a comprehensive approach, treatment can

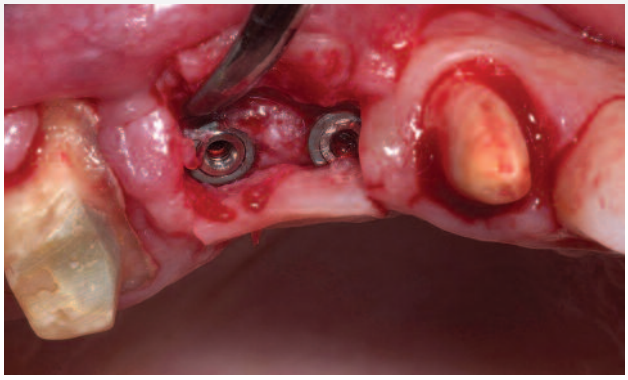

Figure 21a: Uncovering of implants four months after placement.

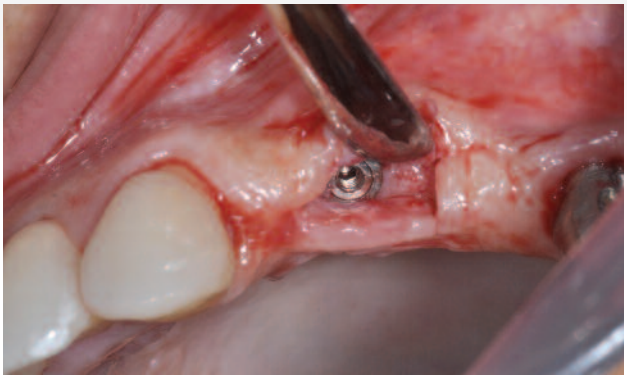

Figure 21b

Figure 22a: Restoration of Ankylos implants with Atlantis abutments and E.max crowns.

Figure 22b

Figure 22: Restoration of Ankylos implants with Atlantis abutments and E.max crowns.

Figure 23: Fully restored and rehabilitated dentition.

be properly planned, delivered in a phased manner and executed to a high standard.

The maintenance and aftercare programme will help ensure ongoing success of the treatment delivered.

References

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