RADIO "LOGICAL" REFLECTIONS

When making a diagnosis must not be delayed

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1 - PRESENTATION OF CLINICAL CASES

Case n° 1

Miss B, a 24 year old Moroccan woman consulted us seeking treatment that would improve her appearance before her upcoming marriage. She was in perfect health, had suffered no previous notable health problems, definitely no traumatic incidents. She had a Class II division 2 subdivision right malocclusion with crowding and a severe anterior overbite (see fig. 1 to e). A labial fistula had developed in the lower anterior region. All teeth tested vital but periodontal probing revealed deep pockets (see fig. 2 a to d).

Case n° 2

Mme. S, 28 years old and 4 months pregnant with no significant health history, consulted us about the pronounced extrusion of her maxillary incisors and the diastemas between them that seemed to have worsened recently (see fig. 4 a to e). Her oral hygiene was satisfactory but there were several areas of minor accumulation of tartar. Our clinical examination revealed a Class II division 2 malocclusion with a steep anterior overbite in which the lower incisors were biting into the palate. Periodontal probing revealed pockets in the maxillary incisor area of over 4 mm in depth with bleeding and pus formation. All the teeth read positive on vitality tests.

2 - DESCRIPTION OF THE RADIOGRAPHIC RECORD

For each of the two patients we ordered panoramic X-rays and long cone periapical films, the latter of which were postponed for the pregnant patient. The first panoramic film (fig 3 a, first patient) showed severe

alveolar bone loss with angular lesions that reached the apical third of the premolar and molar teeth. Diastemas had opened up in various sites between the upper right second bicuspid and the upper left first

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Figures 1 a to e
Intraoral photographs of patient n° 1.

Figures 2 a to d
Views of the orthodontist performing a periodontal examination by probing for pockets around the incisor and molar teeth at the initial consultation: the pockets were deep, some were connected with the fistula, and bleeding was abundant.

Figure 3 a
Patient n° 1's initial panoramic film.

Figure 3 b
Long cone periapical films of patient n° 1.

a

b

c

d

e

Figures 4 a to e
Intraoral photographs of patient n° 2.

molar. Unfortunately the patient was incorrectly positioned when the radiograph was taken making it difficult to interpret certain sectors, notably causing superimposition of the left canines and bicuspid, teeth that are not, in fact, overlapping in the mouth. In addition the right molars seem to be narrower than those on the left whose X-ray depiction makes them somewhat larger and deformed.

The second film (fig. 5, patient n° 2) shows severe bone loss apparently

confined to the four maxillary incisors and the upper molars.

To confirm the diagnosis and suggest a course of periodontal treatment a full series of long cone periapical X-rays that are taken with an X-ray beam aimed on a line strictly perpendicular to the long axes of the teeth is indicated. These films (fig. 6) gave a clear picture of the areas of bone loss that can take the form of craters or infrabony lesions at one or two or three borders and into furcations. The low level of

Figure 5
Panoramic film of patient n° 2.

Figure 6
Some long cone periapical films of patient n° 2.

cortical bone and the absence of the lamina dura that blurs the limits of

visible bone are distinct indications of the presence of acute periodontitis.

3 - WHAT SHOULD THE DIAGNOSIS BE?

Aggressive periodontal diseases ("juvenile periodontitis" or "rapidly progressing periodontitis" are no longer accepted terms) are dental maladies that should be taken quite seriously especially since the relatively mild appearance of their discreet clinically observable symptoms, decapitated papillae and mild fluid gingival discharge, do not accurately reflect the gravity of the underlying osseous lesions. However, marked inflammatory manifestations and abundant deposits of calculus are often noted in generalized forms of the disorder. As obvious, and then painful symptoms develop very slowly, patients may delay consulting a dentist until complications of infection, an abscessed fistula with patient n° 1, and secondary migrations and elongations of teeth with diastemas opening up with patient n° 2, manifested themselves.

By this time in the course of the disease, the typical breakdown of gingival papillae bears witness to the brutality of the osseous destruction that can no longer support the gingiva, which has not had time to adjust to the new architecture of the underlying bone.

The difference between localized and generalized periodontitis depends on the number and location of the teeth affected. The consensus conference of 1999 declared that periodontitis should be deemed generalized when it affects at least three teeth other than molars and incisors. In a preliminary examination of the panora-

mic X-ray films one might conclude that patient n° 1 was suffering from an aggressive generalized periodontal disease while patient n° 2's condition was localized. But the results of periodontal probing, on all four tooth surfaces, as shown in figure 7 a and 7 b, showed that the periodontitis was generalized for both patients.

The etiopathogenesis of periodontitis has not yet been completely elucidated. At one time it was considered to be infectious in origin because localized forms of it responded well to antibiotic therapy taken systemically in combination with scrupulous non-surgical mechanical cleansing of the affected areas. Today these maladies are thought to be a reflection of a disharmony between the defenses of the host and the bacteria present in the oral cavity.

Today research focuses on malfunction of the polynuclear neutrophils and the mediators of inflammation in general that are directly implicated in periodontal destruction. Following this hypothesis patient n° 2's pregnancy could be responsible for the onset of her acute periodontal symptoms. The hormonal upset, the presence of numerous inflammatory mediators and the angiogenesis accompanying pregnancy favor development of periodontal disease whether it be in her case gingivitis or epulis gravidarum.

Stress, which has also been described as a risk factor for attacks of aggressive periodontitis, may have been a component of patient n° 1's

a

b

Figures 7 a and b

The results of periodontal probing in patient n° 1 (a) and patient n° 2 (b). Facing the number of the tooth, in blue, the distance the gingival attachment has drifted below the cemento-enamel junction at three points buccally and three points palatally is depicted graphically.

Tooth mobility, bleeding, and the presence of tartar deposits are also registered on the charts.

periodontitis. During the preceding year she had to endure the emotional shock of grief for the loss of a dear one.

From an epidemiological point of view certain populations, such as natives, like our patient n° 1, of North Africa, or of sub-Saharan Africa, and of Latin America, have been identified as being at risk. It has been estimated that in the United States localized aggressive periodontitis affects 2% if Afro-Americans compared to the .14% of the White population. Generalized periodontitis has a prevalence of .59% among Afro-Americans but

affects only .03% of the White population.

Some authorities have reported a familial predisposition to aggressive periodontal disease but the transmission pattern seems to be complex and not does not appear to follow Mendelian lines.

A 1999 consensus conference workshop of the American Academy of Periodontology reclassified periodontal maladies. The conference evaluated the etiological importance of: 1) the patient's age; 2) the degree of progression of the malady; 3) the appearance of the malady; 4) signs

Figure 8

of inflammation; and 5) the relative quantity of biofilm found.

According to this formula, aggressive periodontal disease differs from localized and generalized periodontal diseases that are considered to be different versions of the same malady. In both cases of this relatively slowly progressing disorder examiners find inflammation, with its redness, oozing, and bleeding on probing, and moderate to severe accumulation of calculus. For both the genetic and environmental risk factors are similar.

In contrast, aggressive periodontitis presents relatively insignificant inflammation and deposits of plaque and tartar in comparison to the severe loss of gingival attachment and underlying bone that it provokes.

Age as a descriptive term is no longer employed, as it was for so-called juvenile periodontitis, because this tends to lay down chronological limits for the onset of aggressive periodontitis, which is definitely not a parameter clinicians encounter in their daily practice.

4 - WHAT SHOULD BE THE TIMING AND TREATMENT APPROACH FOR THE ORTHODONTIC INTERVENTION?

In these types of cases, the severity, and especially the rapid development of the lesions demand that a complex approach combining non-surgical treatment of the infection be undertaken, followed, depending upon the severity of the bone loss, by periodontal surgery designed to promote healing or regeneration. The orthodontic treatment can begin only after the infection has been controlled, sometimes at the cost a considerable loss of soft tissue. The health of the periodontium must subsequently be established and rigorously maintained before any stabilizing prosthetic rehabilitation or implant supported restorations can be contemplated. This often requires a plan of treatment whose execution will have to be delayed until long after the time the patient had anticipated.

4 - 1 - Restoration of health

This type of periodontal disease must be diagnosed and treated with dispatch because its rapidly progressing nature can, within just a few months, significantly degrade the prognosis. Initial treatment should emphasize the restoration of the affected areas to health by removal of tartar from and thorough cleaning and polishing of root surfaces, accompanied by systemic antibiotic therapy when indicated. The periodontist then, at the proper time, uses sterile paper cones to take from infected pockets bacterial samples that will be subjected to laboratory PCR quantitative

DNA analysis. However, the potential benefits to be derived from these bacterial cultures are limited because at least 400 species of bacteria have been identified in periodontal pockets and so far we have been able to cultivate only a few of them.

From a microbiological point of view, no proof has as yet been established for the association of specific bacterial lines with different forms of periodontal disease. Certain periodontal pathogenic bacteria, like *Porphyromonas gingivalis* or *Aggregatibacter actinomycetemcomitans*, have been recovered from pockets but not in a systematic fashion nor with any correlation with a defined state of the disease. Periodontists can use microbial tests primarily to assess the effectiveness of the course of anti-infection treatment. They cannot characterize the malady.

In the two cases described in this article we undertook global therapy to restore health combined with orally administered antibiotics in consultation with a physician and with assurance of the safety of this modality for the pregnant woman from the reference site for teratogenic agents (www.lecrat.org).

4 - 2 - Periodontal regeneration

Once the progression of the disease has been arrested, certain signs and lesions undergo significant spontaneous improvement with a gain in gingival attachment and a lessening of mobility of teeth.

Figures 9 a to f

Surgical regeneration therapy was accomplished for patient n° 2 in the upper incisor region.

a: 9 months after global disinfection a certain potential for repair can be seen but the infraosseous lesions persist;

b: a reflected flap makes lesions clear and shows the prepared tooth surfaces;

c: Bio-Oss® artificial bone, in combination with Emdogain®, has been placed over the roots;

d: the flap has been sutured back into place;

e: healing after 6 months;

f: healing of bone 12 months post-operatively.

But the majority of the defects caused by aggressive periodontitis remain permanent, making it necessary for an individual prognosis to be prepared for each tooth. While some teeth will have to be extracted, periodontists can save others in areas of angular infra-osseous lesions by employing advanced bone regeneration techniques based on regeneration membranes, autogenous grafts, and bone substitutes.

For patient n° 2, after the birth of her baby, we proposed a treatment plan of

regeneration therapy that consisted of filling osseous defects with the natural bone substitute Bio-Oss®, a material obtained from the mineral portion of bovine bone associated with the matrix stimulating protein complex Straumann® Emdogain and the barrier membrane stimulator Bio-Gide®. With this complex we were able to save the incisor teeth, which, as their bone support improved, spontaneously moved together closing the diastemas (fig. 9 and 10).

Figures 10 a to d

Intraoral photographs taken as part of an orthodontic re-evaluation after a patient's periodontally weakened dentition had been restored to health and bone regeneration had been accomplished. Existing diastemas had spontaneously closed, but control of plaque formation had been imperfect. The excessive anterior overbite constitutes a periodontal risk factor although it was not the patient's primary concern. She had sought orthodontic treatment to correct the marked difference in the incisal levels of her upper central incisors.

Patient n° 1, after her periodontal condition had stabilized, declined our proposal of surgical treatment for the molars and premolars, limiting further care to regular maintenance visits.

4 - 3 - Orthodontic and periodontal maintenance stages

Orthodontists can undertake to treat malocclusions of adult patients whose weakened periodontium has been restored to health but they must be sure that their objectives are realistic.

They can often, for example, improve aesthetics by closing anterior diastemas between teeth that had drifted as a secondary consequence of periodontal disease. And, as in the cases of the two patients whose treatments we have described, they can correct excess anterior overbite, a known traumatic factor, for which orthodontic treatment can improve the long term periodontal prognosis.

But there is as yet no real consensus regarding the extent of permissible orthodontic treatment following regeneration of bone. Recent studies tend to show that the application of light

orthodontic force applied soon after regeneration has no deleterious effect on that newly formed bone. Several research teams suggest that after a delay of just two weeks from the time of periodontal surgery accompanied by the placement of Bio-Oss® artificial bone, orthodontic treatment can begin, provided it is conducted with careful light force because of the feeble support provided by the new osseous tissue.

Orthodontists are advised to use bonded attachments instead of bands in treating adult patients because they permit a better control of oral hygiene and where possible to use splints and/or fixed anchorage with mini-implants to relieve the stress on teeth made more fragile by periodontitis.

This type of anchorage is discussed in detail in our journal issue devoted to active treatment.

It is imperative for patients to adhere to a scrupulous regimen of oral hy-

giene during the course of orthodontic therapy and to visit a periodontist at regular intervals, usually six weeks.

4 - 4 - Prosthetic rehabilitation stage

The placement of implants is not contra-indicated after the periodontal malady has been stabilized. The principal problems are usually related to the extent of the bone grafts that have previously been performed to replace serious bone loss and to maintenance of good oral health.

Patients should be made fully aware of the fragility of their periodontium and its susceptibility to relapse. Without continuous support therapy the possibility of that relapse is increased and, in its weakened condition, the dentition may then suffer definitive loss of teeth.

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