

## JCO INTERVIEWS

# Bjorn U. Zachrisson, DDS, MSD, PhD on Current Trends in Adult Treatment Part 1

**DR. KEIM** Do you find that more older adult patients, over age 65, are seeking orthodontic treatment?

**DR. ZACHRISSON** There is a worldwide trend for more and more adults to be interested in orthodontic treatment. People with different kinds of malocclusions, even those who are older than 65, are now realizing that it is possible for them to undergo extensive orthodontic treatment. For the past 15 years, we have had a considerable number of older adults in our office, and the number is increasing. In 2000, I published an article for the inaugural issue of the *World Journal of Orthodontics* that reported our clinical experiences in a consecutive sample of elderly persons whom we treated between 1990 and

1998.<sup>1</sup> This material consisted of 36 patients between 65 and 82 years of age.

Our sample comprised patients with all common forms of dental malocclusions (Figs. 1-6), but no surgical cases. Several of them represented special interdisciplinary categories common to adults, including preprosthetic orthodontic treatment (Figs. 1,4,5) and alignment of teeth with pathologic tooth migration associated with advanced periodontal tissue breakdown (Fig. 2).

**DR. KEIM** What are the major differences in the treatment of patients in the adolescent dentition, the full adult dentition, and what has been referred to as the “mature” dentition—patients over the age of 65?

**DR. ZACHRISSON** It is obvious and logical that the treatment plans for elderly patients should frequently be different from those for adolescents and younger adults.<sup>2-5</sup> Both the status of their dentitions and their subjective demands for correction must be taken into consideration. Compared to younger adults, the older adults may have fewer teeth, edentulous spaces, failing restorations, hopeless teeth, more wear and abrasion, more artificial crowns, more advanced periodontal tissue destruction, more pronounced gingival recessions (interdental and labial), higher frequency of uneven gingival margins due to combinations of supraeruption and wear, and a greater need for implants, preprosthetic treatment, and molar uprighting.

**DR. KEIM** Do older patients have different priorities when seeking orthodontic treatment?

**DR. ZACHRISSON** Yes, that is my experience.



Dr. Zachrisson



Dr. Keim

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**Fig. 1** A. 80-year-old woman in whom maxillary right first premolar (arrow) had drifted distally and rotated 70°, making prosthetic reconstruction difficult, if not impossible. Patient had bilateral agenesis of lateral incisors and no midline deviation. B. Bonded attachments with labial push-coil and lingual elastic chains used for seven months to derotate premolar. C. Prosthetic rehabilitation. (Reprinted by permission.<sup>1</sup>)

With increasing age, the patient’s treatment objective may become limited to taking care of only the most obvious needs. The extraction alternatives may differ from those in younger adults. Asymmetric and strategic extractions may be used to eliminate existing damaged teeth<sup>2,5</sup> (Fig. 3) and to solve alignment problems (Fig. 4). For example, in four of our elderly extraction patients, only one premolar was extracted (Fig. 4), which would be unusual in adolescents and young adults.

Some older adults may have several different malocclusion traits that they themselves consider to be of different magnitudes of importance. For instance, the 74-year-old female patient in Figure 3, although a public person who frequently appeared on TV as a pianist and expert panelist, was not motivated enough to use orthodontic appliances in the maxillary arch to level and align her two overlapping central incisors. However, she was not willing to accept the space in the mandibular arch after the necessary extraction of an incisor with hopeless prognosis.

Similar decisions were made by other older

**TABLE 1**  
**ORTHODONTIC TREATMENT BY**  
**PATIENT AGE (36-PATIENT SAMPLE<sup>1</sup>)**

	Number of Patients by Age (Years)		
	65-70	71-80	81-90
One arch only	6	11	2
Both arches	11	6	0

patients, who were treated only in one dental arch after thorough discussions of their orthodontic needs (Figs. 1,4-6). In our sample, the use of single-arch fixed appliances increased in frequency as the patient’s age increased (Table 1).

**DR. KEIM** To what extent do the older patient’s subjective needs for treatment figure into diagnosis and treatment planning?

**DR. ZACHRISSON** For the orthodontist to be realistic and empathic, the elderly patient’s subjective need for orthodontic correction of tooth



**Fig. 2 A.** Older female patient with tooth migration, particularly of maxillary right central incisor, due to periodontal tissue breakdown. **B.** Patient practiced excellent oral hygiene during orthodontic treatment. Result is retained with bonded lingual retainer. **C.** Note significant improvement in dental and facial appearance from selecting realistic, rather than idealistic, restorative treatment objective. (Reprinted by permission.<sup>1</sup>)

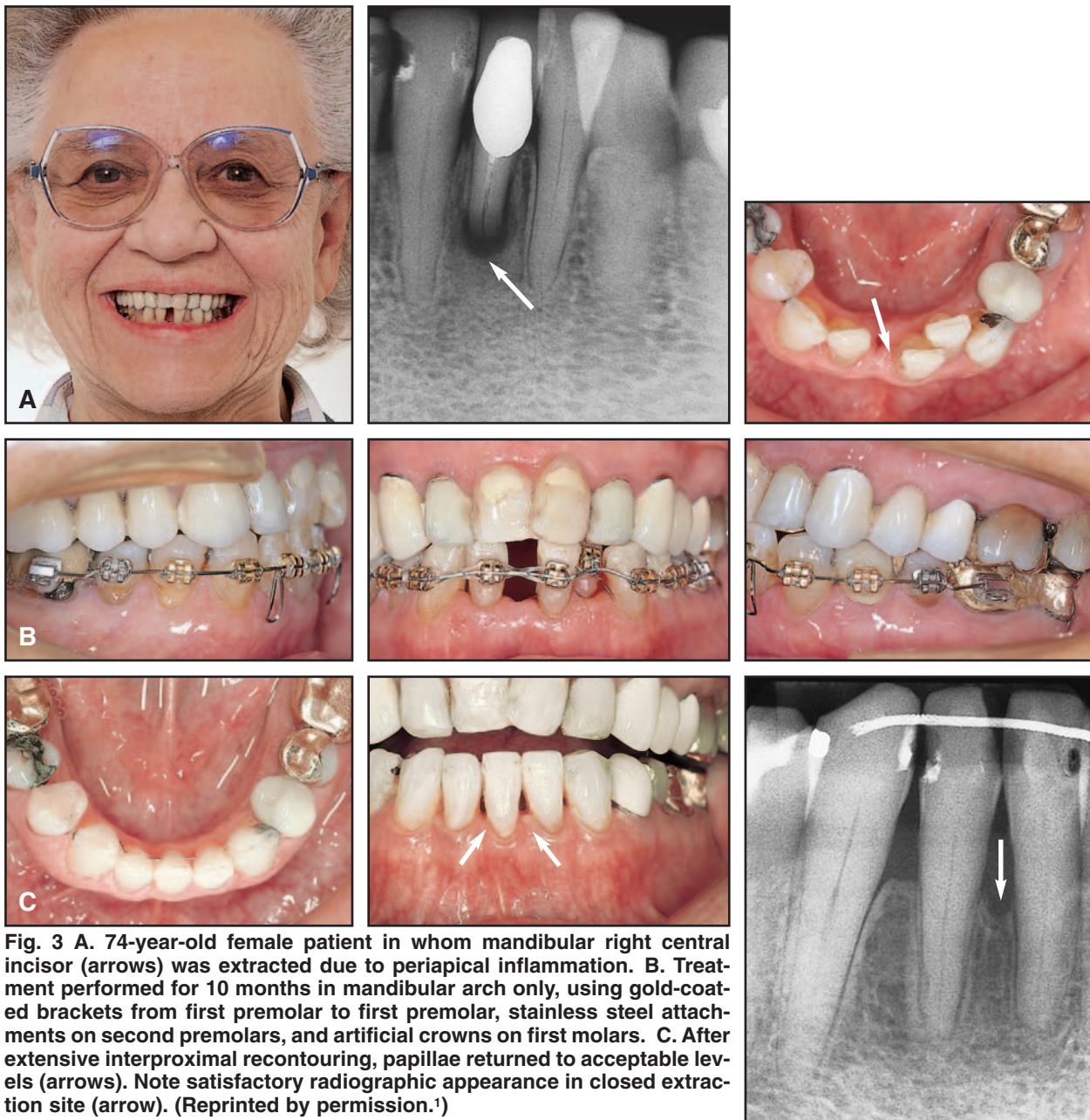
positions should be duly respected. In discussions between the orthodontist and the older adult patient regarding possible treatment procedures and different envisioned goals, both parties must have their say. On the other hand, in several elderly patients, we experienced that the appetite was growing as the patient was eating. In other words, in some patients where a compromise solution was preferred at the start, a more complete solution including tooth extractions was decided upon in the middle of therapy.<sup>1</sup>

**DR. KEIM** How does the orthodontist's approach to treatment planning change in dealing with such patients?

**DR. ZACHRISSON** Kokich recently contended that the treatment objectives in adults and elderly patients should be realistic, rather than idealistic.<sup>5</sup> He divided the realistic objectives into

four categories: occlusal, periodontal, restorative, and economical. The team of specialists should interact together to make prudent treatment decisions for the patient. Realistic rather than idealistic treatment goals may imply a major change in treatment objectives compared to what we try to achieve in younger patients with similar malocclusions. In individual cases, compromises may be necessary with regard to one or more of the objectives, including aligning and leveling of the arches, correction of midline deviation, reduction of overjet, correction of overbite, and establishment of Class I molar and canine relationships.<sup>5</sup>

In contrast to adolescents, patients who are 40-60 years of age, or older, have a dental history. When known, this history makes it possible to predict future development. By contacting the referring dentist and learning about the patient's



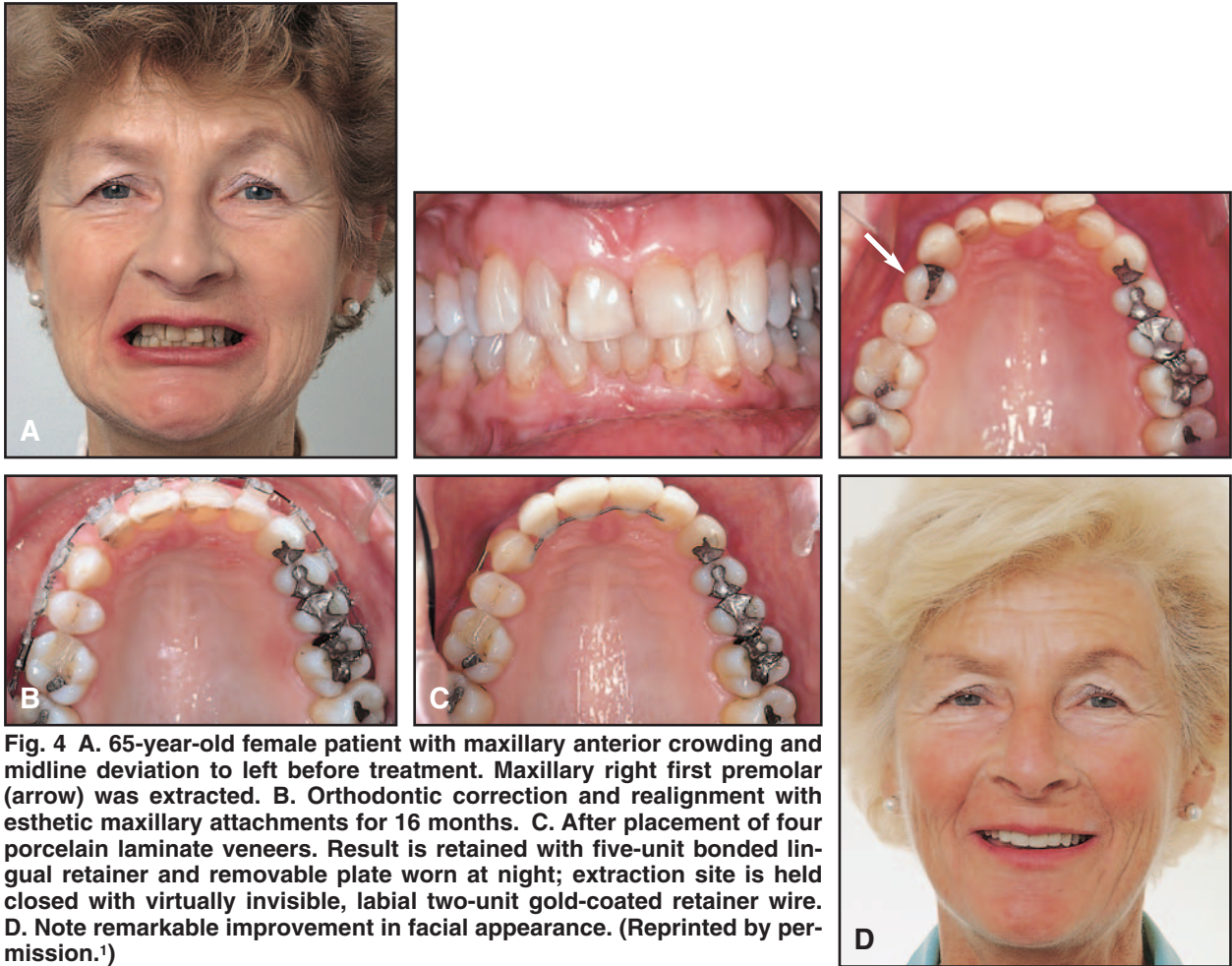
**Fig. 3** A. 74-year-old female patient in whom mandibular right central incisor (arrows) was extracted due to periapical inflammation. B. Treatment performed for 10 months in mandibular arch only, using gold-coated brackets from first premolar to first premolar, stainless steel attachments on second premolars, and artificial crowns on first molars. C. After extensive interproximal recontouring, papillae returned to acceptable levels (arrows). Note satisfactory radiographic appearance in closed extraction site (arrow). (Reprinted by permission.)

dental development over time, useful information can be gained with regard to dental awareness, evidence of temporomandibular disorders, parafunctional occlusal habits, periodontal status, alveolar bone levels, abraded incisors, degree and type of wear facets on incisors and in the canine-premolar regions, etc. By this means, it may be possible to forecast the susceptibility to further periodontal tissue breakdown, the type of bone destruction that can be expected, the kind and speed of continued bruxism that is likely to occur, and so on. Useful treatment alternatives to

conventional approaches may be found. For example, in a periodontally stable patient with overerupted incisors (or posterior teeth) and poor crown-to-root ratios, incisal grinding rather than intrusion of the supraerupted teeth may be the appropriate treatment solution.<sup>5</sup>

**DR. KEIM** How does the typical appointment differ between older and younger patients?

**DR. ZACHRISSON** We spend more time per visit for the elderly adults than for younger



**Fig. 4** A. 65-year-old female patient with maxillary anterior crowding and midline deviation to left before treatment. Maxillary right first premolar (arrow) was extracted. B. Orthodontic correction and realignment with esthetic maxillary attachments for 16 months. C. After placement of four porcelain laminate veneers. Result is retained with five-unit bonded lingual retainer and removable plate worn at night; extraction site is held closed with virtually invisible, labial two-unit gold-coated retainer wire. D. Note remarkable improvement in facial appearance. (Reprinted by permission.<sup>1</sup>)

patients. Most older patients have retired from work, and the visit to the orthodontist may be the day's highlight for them. Therefore, we try to set aside ample time for discussions and social conversation, so that they feel taken care of, even if only minor adjustments of their appliances are really needed.

**DR. KEIM** What special precautions must be taken for older patients?

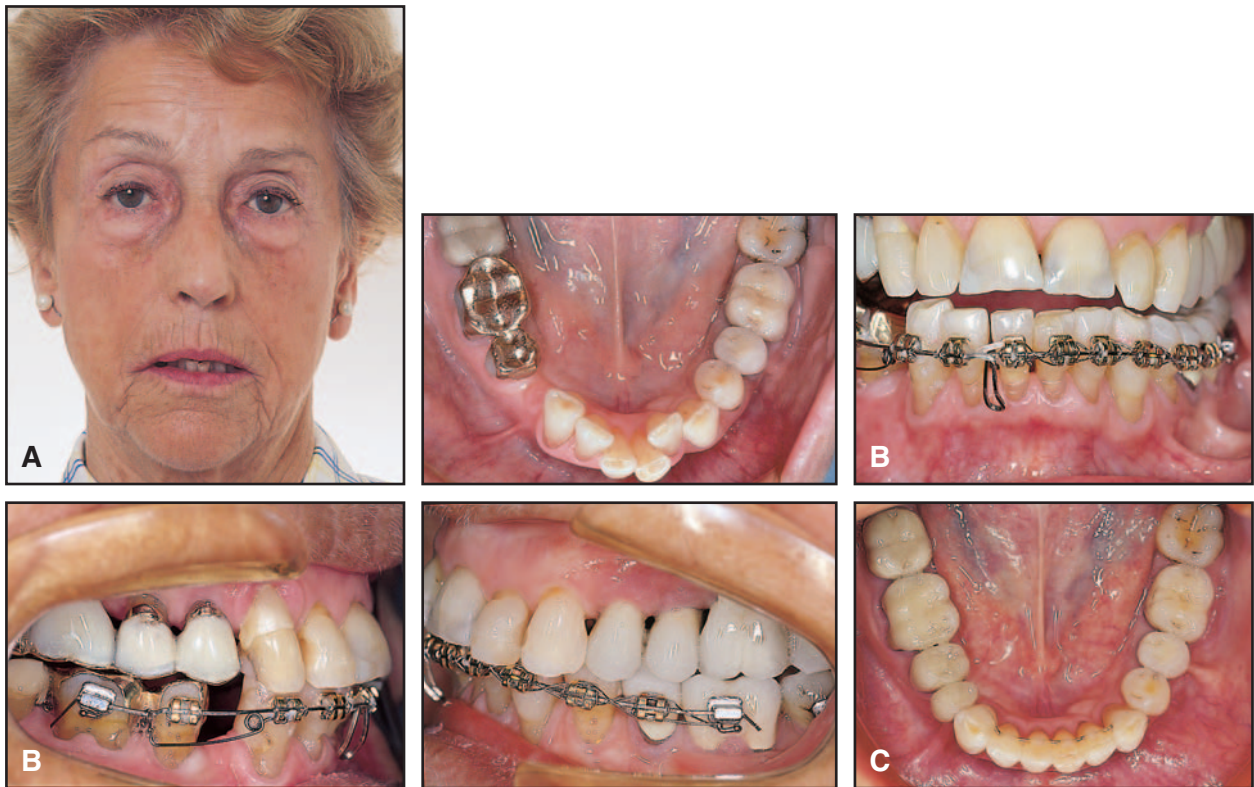
**DR. ZACHRISSON** In general, our clinical experience indicates that orthodontic treatment can be carried out in older patients with few complications. This is true in terms of both patient compliance and cooperation, as well as with regard to the rate of tooth movement and the need for extra visits during treatment. Older adults in our office are highly motivated for the esthetic and functional improvement of their malocclusions, and their oral hygiene is excellent. In all our elderly

patients, the treatment has progressed as planned and anticipated, and the fixed appliances have only been removed in one patient, who was over 90 years of age at the start (Fig. 7). At her age, the strain and pain associated with the treatment obviously was annoying to her, and we therefore decided to stop the treatment after about four months.

In our sample, the healing capacities of the alveolar bone, including the radiographic appearance of the closed extraction sites, were surprisingly normal. The repair after the extraction of a diseased mandibular incisor with marked periapical translucency at the start was almost complete even in a 74-year-old female patient (Fig. 3).

**DR. KEIM** Are there any contraindications to treatment of older patients?

**DR. ZACHRISSON** No, not really. It may be



**Fig. 5** A. 81-year-old female patient treated for mandibular crowding. B. Appliance bonded to natural and artificial teeth in lower arch only. C. Result retained with six-unit bonded lingual retainer.

wise not to treat if the periodontal situation is dubious, with extensive loss of bone support, and if many teeth have a poor or hopeless prognosis. This may prevent the use of toothborne anchorage. On the other hand, it may also be wise not to stretch the treatment goals for older adults beyond necessity and/or beyond the patient's subjective need for correction.

Still, the benefits of the dental and facial changes resulting from orthodontic treatment were evident to the elderly patients in our sample, and they generally reacted very favorably. Many expressed a high degree of satisfaction with having had the courage and incentive to perform the treatment. In most cases, the degree of dental and facial improvement was remarkable (Figs. 2,4,10)—frequently beyond pretreatment expectations. This increased self-esteem was reflected in the patients' increased use of makeup, new hairstyles and coloring, and generally more concern with their personal appearance (Figs. 4,10).

**DR. KEIM** What other limitations are there as to what can be accomplished for older patients

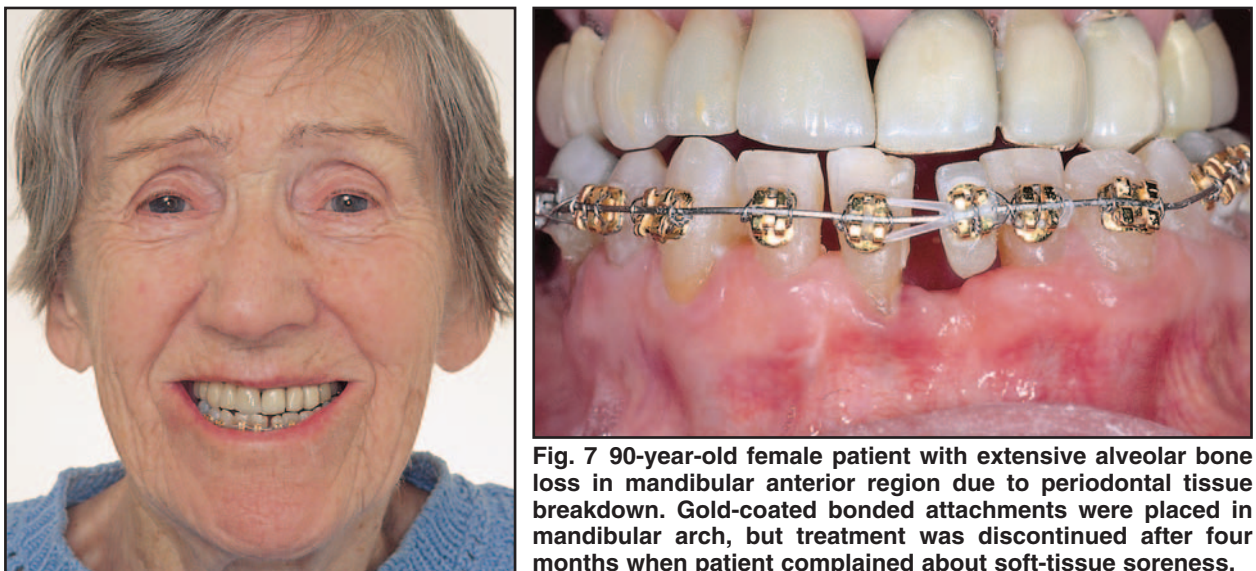
compared to younger adults?

**DR. ZACHRISSON** Due to frequent deviations in tooth morphology and previous damage to periodontal hard and soft tissues, it is generally more difficult to obtain esthetically optimal results in older orthodontic patients than in younger adults. Particularly, it is difficult to get intact gingival papillae between all approximated teeth (Figs. 3,6). Extensive stripping (mesiodistal enamel recontouring)<sup>6,7</sup> will be required in almost all cases to make the teeth more optimal in shape and connector areas,<sup>8,9</sup> and to relocate their contact points gingivally,<sup>6,10</sup> so that acceptable interdental conditions can be arrived at (Figs. 2-6).

Furthermore, the tendency for reopening of closed extraction sites may be greater in the elderly population.<sup>2,6</sup> For this reason, we like to use short, two-unit buccal retainers of gold-coated flexible wire in these sites<sup>6</sup> (Fig. 4C). In a few older adult patients, the movement of teeth to close extraction sites may be atypically slow. Attempts to either increase or decrease the amount of force used to move such teeth do not seem to



**Fig. 6** A. Older female patient in whom mandibular left central incisor was damaged (arrows), with large mesial chip. B. Extensive interproximal stripping and orthodontic alignment. C. Result shows improved tooth morphology and intact papillae between all incisors.



**Fig. 7** 90-year-old female patient with extensive alveolar bone loss in mandibular anterior region due to periodontal tissue breakdown. Gold-coated bonded attachments were placed in mandibular arch, but treatment was discontinued after four months when patient complained about soft-tissue soreness.

make a difference in these patients.<sup>1</sup> They may simply be “slow movers”, as demonstrated in animal experiments.<sup>11</sup> Large individual differences may occur with regard to the rate of tooth movement, and the magnitude of force may not be decisive. Individual differences in bone density, bone metabolism, and turnover in the periodontal ligament may be responsible for this variation.<sup>11</sup>

Another limitation may be imposed by a deliberate compromise in selecting the treatment goal. For this reason, the orthodontic treatment period may generally be shorter for elderly patients than for adolescents. In our sample of 36 patients aged 65+, the majority of treatments lasted about one year. In four patients, the treatment period was shorter than six months, and it exceeded 18 months in less than 20% of these patients.<sup>1</sup>

**DR. KEIM** You mentioned the short buccal wires that you use to retain closed extraction sites. Do you use more fixed retainers in general for your older patients?

**DR. ZACHRISSON** Permanent retention with bonded lingual retainers can be a more attractive post-treatment alternative the older the patients are. In practically all of our older adult patients, the treatment result in both the maxilla and the mandible is maintained with .0215" flexible gold-coated retainer wires\* that are bonded on the lingual tooth surfaces of four, five, or six teeth (Figs. 3-5). Such retainers are, of course, invisible from the front, and therefore, none of them has been removed so far, and none may ever be removed.

**DR. KEIM** What are the alternatives to orthognathic surgery for correction of Class II and III malocclusions in older adults?

**DR. ZACHRISSON** In general, our surgeons at the University Hospital do not like to perform extensive orthognathic facial surgery on patients over 35-40 years of age. Studies in Sweden by

\*Gold'n Braces, Inc., 2595 Tampa Road, Suite 1, Palm Harbor, FL 34684.

Westermarck and colleagues have shown that the risk for unwanted side effects, like development of nerve damage and impaired sensitivity (numbness) of the lower lip and chin, increases with patient age.<sup>12</sup> This is particularly true with the sagittal split-ramus osteotomy for mandibular advancement.

Therefore, compromise solutions may often have to be selected for older adult patients who have apparent skeletal deviations. For elderly patients with Class III malocclusions, such treatment alternatives may include the extraction of a single incisor<sup>13</sup> or both mandibular first molars.<sup>14</sup> For those who have Class II malocclusions, the compromises may include upper first premolar extractions and/or deliberate frontal expansion of the mandibular incisors, necessitating permanent retention.

**DR. KEIM** Is the extraction of a single lower incisor a viable option?

**DR. ZACHRISSON** Treatment by extraction of a single mandibular incisor is not very popular in our profession, despite the apparent advantages of extraction in the region of crowding. Objections to this extraction option are generally based on case reports or subjective clinical opinion after observing less desirable outcomes in treated Class I and Class II malocclusions.<sup>13</sup> Unwanted side effects have included increases in overbite and overjet beyond acceptable limits, space reopening, partly unsatisfactory posterior occlusion, and unesthetic loss of the interproximal papillae in the lower incisor region. However, generalized statements regarding the usefulness of mandibular incisor extraction cannot be made. There is an obvious need for careful differential diagnosis in orthodontic treatment planning before incisor extraction is performed.

**DR. KEIM** Single-incisor extraction has been advocated for the treatment of mild Class III malocclusions.

**DR. ZACHRISSON** If the cases are carefully selected (Figs. 8-10), this extraction option may provide better anterior interocclusal relations





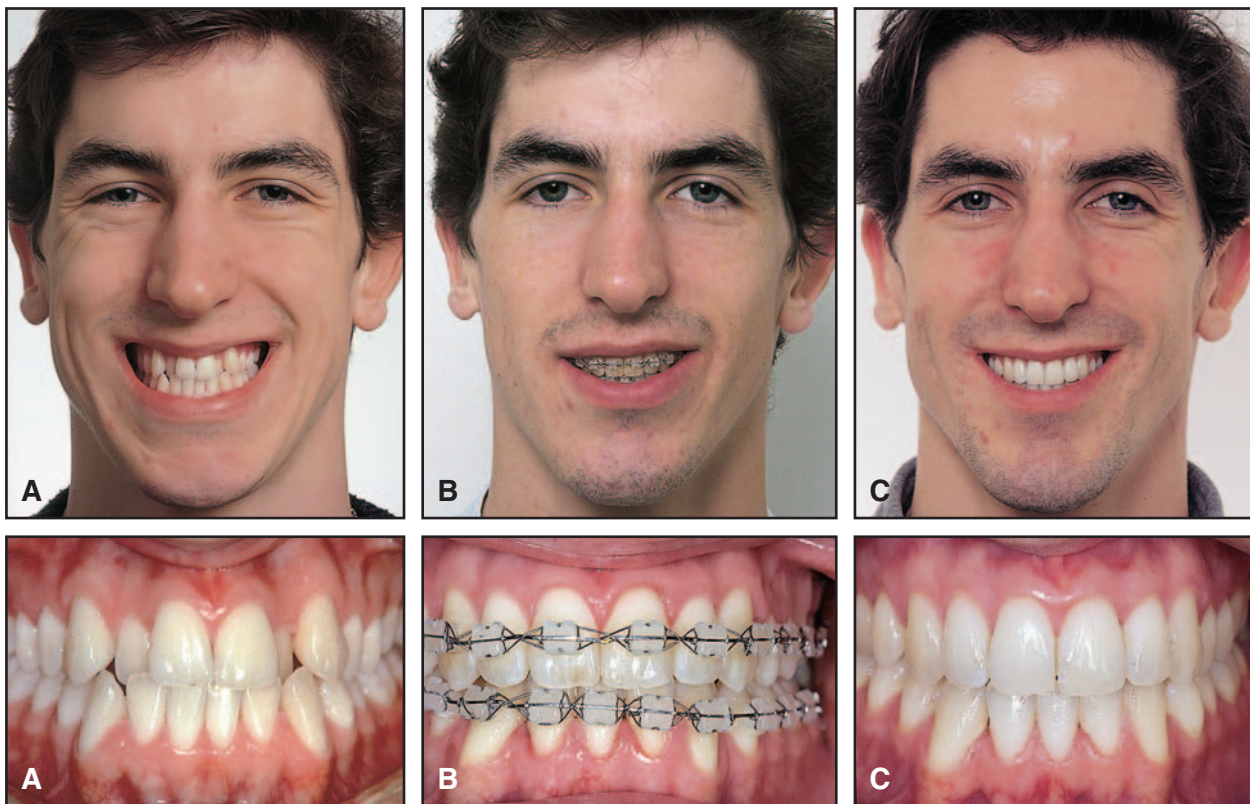
**Fig. 8** Treatment result after extraction of single mandibular incisor in young adult female patient with Class III and open-bite tendencies. Improved anterior occlusion and good posterior interdigitation are evident.

than other extraction or treatment alternatives.<sup>7,13,15,16</sup> Several authors have remarked that a frequent consequence of a single incisor extraction is an increase in overbite and overjet.<sup>7,17,18</sup> This would be beneficial in the treatment of Class III cases with an open-bite tendency, whereas it could be quite undesirable in Class II deep-bite cases with accentuated overjet.

In 1999, we published a clinical and radiographic 36-case study of the treatment outcome and change in mandibular incisor position after extraction of a single lower incisor.<sup>13</sup> All our patients were adults who had a tendency toward or an established mild-to-moderate Class III malocclusion with reduced overjet and overbite. The mean post-treatment observation time was 4.3 years (S.D. 2.3), but all patients still had bonded mandibular lingual retainers at the time of follow-up. The anterior occlusion was improved in

all cases (Figs. 8-12), and the esthetic outcome was generally satisfactory, with preserved gingival papillae between the three mandibular incisors as a result of careful stripping and an emphasis on optimizing the axial inclinations of each lower incisor (Figs. 8-10). The incisor extraction decision was supported by a large intercanine distance, relatively minor crowding, some mandibular tooth-size excess, and normal rather than triangular incisor shapes. In most cases, the post-treatment occlusal status was satisfactory, with bilaterally good interdigitation of the posterior teeth (Fig. 8). In a few cases, however, the posterior occlusion at the end of treatment was less satisfactory, with a tendency toward a unilateral edge-to-edge occlusion of the canines or premolars.

On the cephalograms, the mandibular incisor tips moved posteriorly 1.7mm (S.D. 2.0)



**Fig. 9 A.** Young adult male patient with Class III and open-bite tendencies before treatment. **B.** Orthodontic treatment after extraction of mandibular right central incisor and extensive interproximal stripping of maxillary teeth. **C.** Typical improvement in anterior occlusion, with increased overbite and notably better facial appearance.

and occlusally 1.5mm (S.D. 1.8) from pre- to post-treatment, and tipped lingually about 6°. However, there were large individual variations, and the mean changes cannot be used for prediction of treatment responses in individual cases. On the other hand, even minor vertical and sagittal changes of the incisors may be enough to improve the anterior occlusion by a clinically important amount.

**DR. KEIM** What is the upper limit of severity for this treatment modality? How bad a Class III can be successfully treated with single-incisor extraction?

**DR. ZACHRISSON** I don't know. As I mentioned, our sample consisted of 36 adults with only a tendency toward or an established mild-to-moderate Class III malocclusion, with reduced or no overbite. The mean ANB angle at the start of treatment was .5° (S.D. 2.7). The anterior occlusion was a mild anterior crossbite of one or sev-

eral teeth in 22 cases, an edge-to-edge occlusion on at least one incisor in five cases, and a normal overlap in the remaining cases. Therefore, our material was not suited to finding out how far one can go with this treatment option.

**DR. KEIM** How common is the loss of the papillae after extraction of a single lower incisor?

**DR. ZACHRISSON** It should be emphasized that even though marked anterior irregularity can be resolved adequately by one-incisor extraction when observed from an occlusal view (Fig. 3), a loss of the gingival papillae between the three remaining incisors may still make the final treatment result esthetically unsatisfactory (Figs. 3,11,12). Generally speaking, the older the patient, the easier it is to lose part or all of the interdental gingival papillae during orthodontic treatment. Kokich Jr. and colleagues have reported that small black triangles between the teeth may not be noticeable enough to lay people to



Fig. 10 A. 70-year-old female patient with Class III tendency and increasingly unesthetic spacing of maxillary incisors. B. Noteworthy esthetic and dental improvement after extraction of single mandibular incisor to allow retraction of mandibular dentition and leveling of maxillary teeth. (Reprinted by permission.<sup>1</sup>)

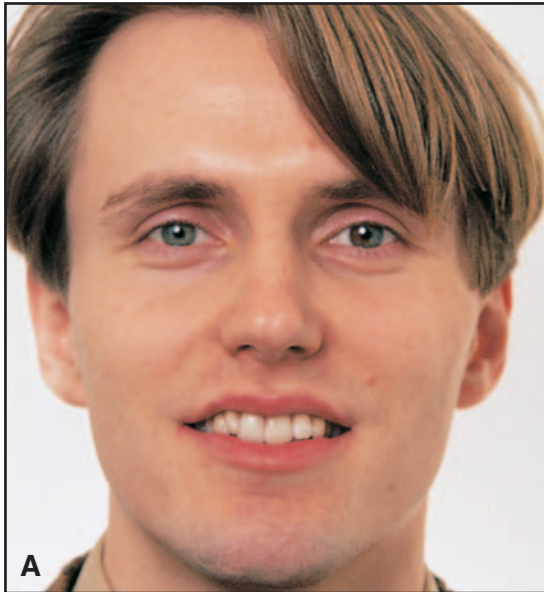
justify their correction, whereas larger recessions are identifiable and less acceptable.<sup>19</sup> Also, the risk of creating some labial gingival recession while derotating crowded mandibular incisors is evident, particularly when the soft tissues are thin (Fig. 12).

Therefore, cases with marked crowding and triangular incisors should preferably be treated by nonextraction approaches, including extensive mesiodistal stripping of the incisors and premolars, to maintain the interdental gingival papillae (Figs. 6,13).

**DR. KEIM** What other special considerations

are there in single-lower-incisor extraction cases?

**DR. ZACHRISSON** Somewhat unexpectedly, we found in our study that the mean treatment times were not notably shorter than those of routine orthodontic treatments involving premolar extractions.<sup>13</sup> One-lower-incisor extraction cases may be more complicated than expected at the start, and may not allow clinicians to use simple mechanics to achieve good results. The main reason for the relatively long treatment periods were unexpected lingual tilting of one or both mandibular canine crowns, as observed when the pa-



**Fig. 11 A.** Bimaxillary crowding in 33-year-old male patient with Class III malocclusion, reduced overbite, and narrow maxillary lateral incisors. **B.** After extraction of damaged mandibular right central incisor and 21 months of orthodontic treatment. Despite extensive interproximal stripping of upper and lower incisors, patient shows pronounced loss of papillae in mandibular anterior region (arrows).

tient was examined from the front, and unwanted narrowing of the intercanine width. Torque control of both mandibular canines is therefore necessary throughout the treatment period, and the crown torque and axial inclinations of all mandibular teeth may need constant monitoring. Another insight from our study was that it does not seem advisable to level the curve of Spee when extracting one single incisor and treating the mandibular arch only. The mandible may then overclose.

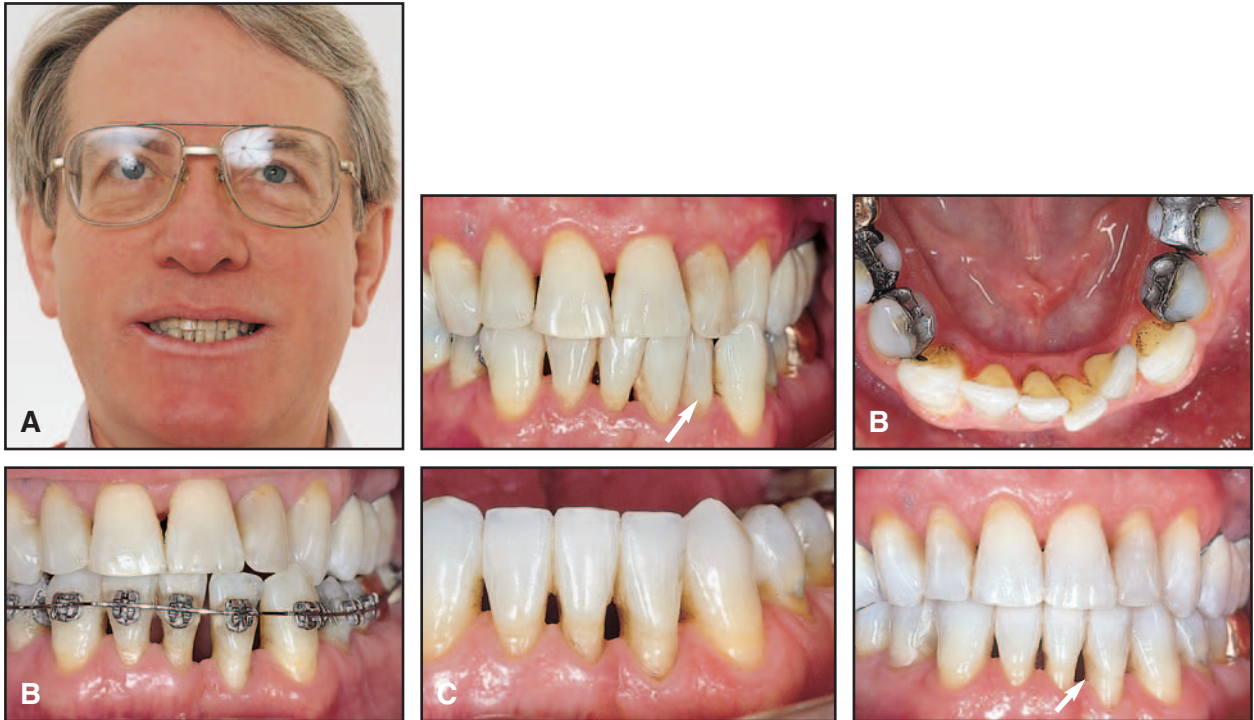
Long-term retention is recommended for patients in whom one lower incisor has been ex-

tracted. This is because the development of even a small diastema in the esthetic zone after treatment is undesirable. The preferred retainer is a five-unit bonded lingual retainer from canine to canine that will keep the teeth together and prevent rotations<sup>6,13,20</sup> (Fig. 3).

(TO BE CONTINUED)

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**Fig. 12** A. Adult male patient with triangular incisors and some loss of papillae before treatment. B. After extraction of single mandibular incisor, papillae of remaining three incisors virtually disappeared during orthodontic treatment, due to triangular morphology. C. Reasonably esthetic final result after extensive interproximal stripping of all upper and lower incisors and continued space closure. Note labial gingival recession that developed during rotation of mandibular left lateral incisor (arrows). (Reprinted by permission.<sup>13</sup>)



**Fig. 13** A. Young adult male patient with mandibular anterior crowding, triangular incisors, oval premolars, and intact papillae between all teeth before treatment. B. Stripping was performed rather than extraction of single incisor to keep papillae intact after treatment.

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