Multidisciplinary interventions for a maximally preservative approach in mutilated dentition and occlusion, and in Stage III or IV periodontitis with severely worn incisors in old adults.

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Introduction

◆ Old patient's desire to eat even in the loss of chewing functions had long term deleterious effects on the periodontium and position of remnant teeth. Particularly, the implant placement in this worsened dentition without considering general occlusal and dentitional condition tends to place the difficulty in later full mouth rehabilitation. How to treat a severely mutilated dentition and occlusion most of time depends on the judgement of primary care dentist. Recent preference of many patients for a maximum preservative approach puts an emphasis on an orthodontic intervention. The initial correction of mal-positioned teeth is desirable to achieve a final good prosthesis and maintain a periodontal status.

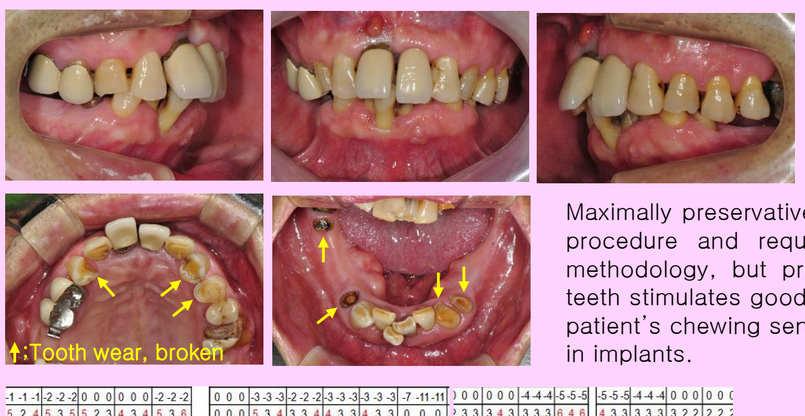
▣ KEUN HY, M, 71.
C.C: Anterior teeth were movable
Medical history: No specific statement in a physical examination
smoker, more than a pack/day, every night alcohol drinking

* Diagnosis
1) Stage IV, Grade B periodontitis[1]
2) Flared out and crowded anterior teeth in deep overbite
3) Severely worn and broken, decayed teeth

* Treatment planning
1) Periodontal therapy of open debridement and GBR
2) Temporary splinting of loose and hopeless teeth
3) Establishing a vertical occlusal height
4) Orthodontic treatment to align and levelling
5) Prostheses with implant, permanent crowns
6) Splinting and crown shaping of lower incisors

* Treatment progress
• 21/09 Splinting of upper 4 incisors and lower 6 incisors during periodontal treatment and temporary esthetic coverage on upper with delayed extraction of hopeless tooth. After periodontal therapy, GBR with absorbable membrane and Xenograft on lower central incisors. Endodontic treatment, bonding post and core resin after crown lengthening on the lower both premolars.
• 21/09 Removable posterior bite block on upper arch to recover vertical occlusal height.[2]
• 21/10 Removed periapical abscess and BGR with xenograft in upper left central incisor and flap operation with BGR of xenograft in interproximal and palatal of upper left canine and lateral incisor.

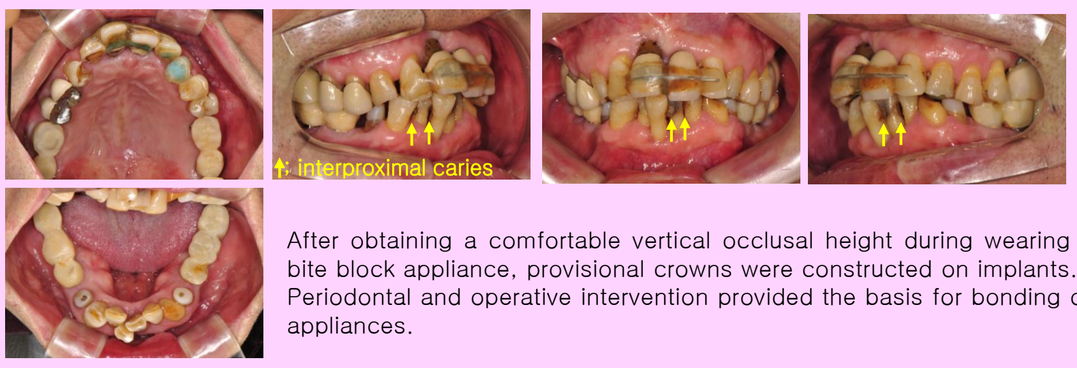
▪ Before treatment; intraoral conditions, periodontal chart



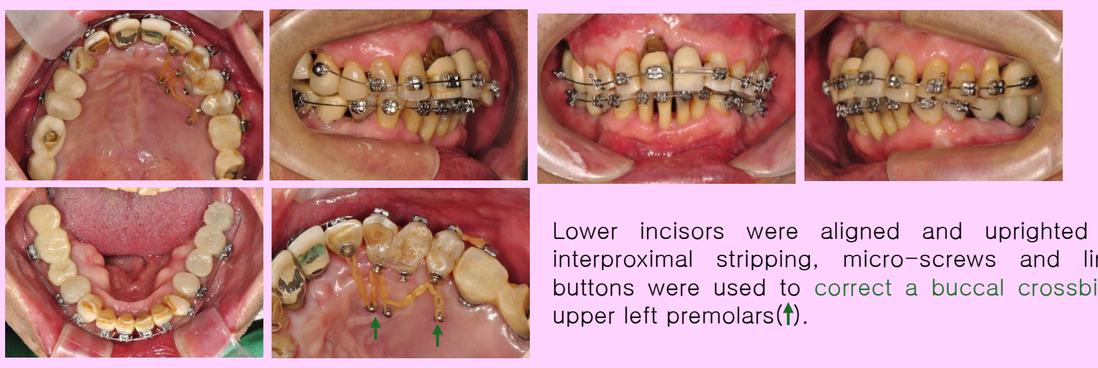
The first examination
Without orthodontic intervention, how many teeth should be removed for prostheses and implants?

Maximally preservative approach must be a complicated procedure and requires a multidisciplinary treatment methodology, but proprioception of conserved natural teeth stimulates good functional occlusion and improves patient's chewing sense, which would not be guaranteed in implants.

Periodontal chart: gingival margin and probing depth
CAL(clinical attachment loss) were severe and lower incisors looked hopeless. Palatal surface of premolars showed severe osseous destruction due to heavy chewing force from scissor bite tendency.



After obtaining a comfortable vertical occlusal height during wearing removable bite block appliance, provisional crowns were constructed on implants.[2]
Periodontal and operative intervention provided the basis for bonding orthodontic appliances.



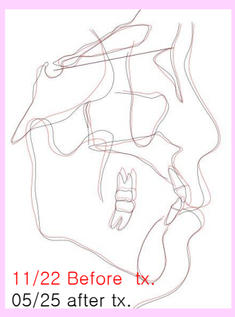
Lower incisors were aligned and uprighted with interproximal stripping, micro-screws and lingual buttons were used to correct a buccal crossbite of upper left premolars(↑).

Fixed appliances were bonded to align and level the deep overbite of crowded anterior teeth without extraction of any lower incisor to resolve crowding. Premolars and canines were distalized to gain space and an anterior arch form was widened, using molar implants as an anchorage.

Upper central incisor implant led to premature interincisal contact of hopeless upper left central incisor and caused a deep infra-bony pocket of a lower left central incisor. Functional occlusal movement was likely to be disrupted due to a mal-positioned central incisor implant, so it was removed later.

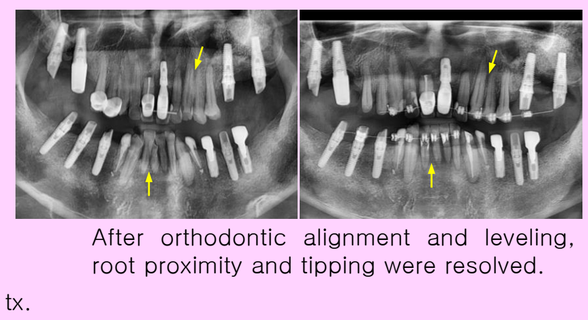
♠ Splinting ♣ Ridge augmentation

♠ Indirect fiber reinforce composite and flowable resin splinting.
♣ GBR and connective tissue graft to augment an alveolar ridge of removed implant and incisor.



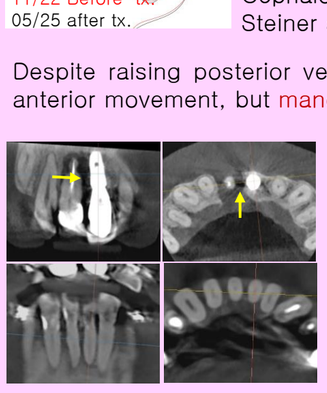
Measure Name	Mean	SD	11/04/2022	05/03/2025
SNA (dg)	82.40	3.20	79.45	79.32
SNB (dg)	80.40	3.10	76.14 *	77.06 *
ANB (dg)	2.00	1.70	3.31	2.26
SND (dg)	77.00	3.00	72.44 *	73.16 *
Pog to NB (mm)	2.12	1.35	1.88	0.91
Occ Plane to SN (dg)	15.24	3.93	18.78	15.16
SN-GoGn (dg)	30.29	5.47	40.65 *	37.85 *
Mx1 to NA (mm)	8.00	2.40	8.99	7.87
Mx1 to NA (dg)	26.20	5.46	26.93	23.78
Interincisal Angle (dg)	124.37	7.90	119.23	129.70
Md1 to NB (mm)	7.90	2.40	10.78 *	9.00
Md1 to NB (dg)	27.30	5.30	30.54	24.26
Wits Appraisal (mm)	-2.24	2.50	-0.04	1.03 *

Cephalometric superimposition
Steiner analysis of before and after tx.



After orthodontic alignment and leveling, root proximity and tipping were resolved.

Despite raising posterior vertical occlusal bite, mandible moved forward as removed the interference of anterior movement, but mandible plane angle was not increased(referred to decreased ANB and SN/GoGn).



Cone Beam Computed Tomography views unseen in 2-D films

• Loss of bone at interproximal area mesial to upper left implant incisor caused a right central incisor to lose bony support.
• Crowding of lower 4 incisors were severe in intraoral pictures. But unseen roots were almost straightened different from crowded crowns.
• Very right orthodontic force was applied for incisors of the least osseous root support.

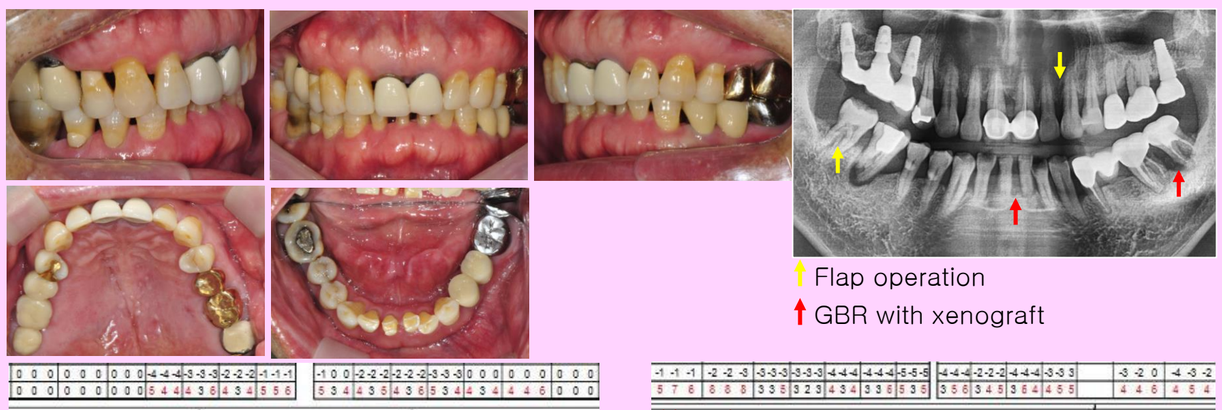
◆ Several implants, fixed denture were seen with advanced chronic periodontitis Stage III on several teeth and severe incisal wear, open space with alveolar bone resorption on lower incisors. Extraction and implant or prostheses were persuasive to patients, explaining some advantages like short treatment time, less cost, not much treatment complexity, compared to maximally preservative approach. Invisible upper incisors stayed where they had been before treatment not to aggravate an old smile pattern. Orthodontic intervention played an important role in restoring lower incisors without much tooth reduction for endodontic treatment and prostheses which would worsen periodontal conditions afterward.

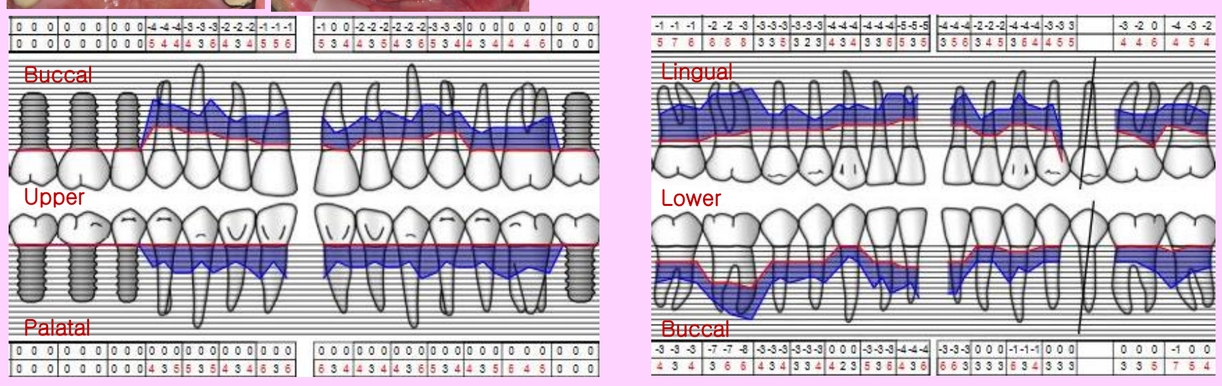
▣ LEE JH. M, 62.
C.C: Lower right 1st molar was loose. Lower anterior teeth were spaced.
Medical history: Hypertension(taking medicine), high cholesterol, often drinking

* Diagnosis
1) Stage III periodontitis, generalized.
2) Deep overbite in altered passive eruption of lower incisors.[3]
3) Incisal wear and incisors' spacing by interincisal contact to old opposite prostheses.

* Treatment planning
1) Periodontal therapy including open debridement and GBR in deep infrabony pockets.
2) Extraction of lower right and left 1st molars.
3) Orthodontic intrusion of over-erupted lower incisors.
4) Prosthetic recovery with implant referred to (any implants were not placed by this presenter).

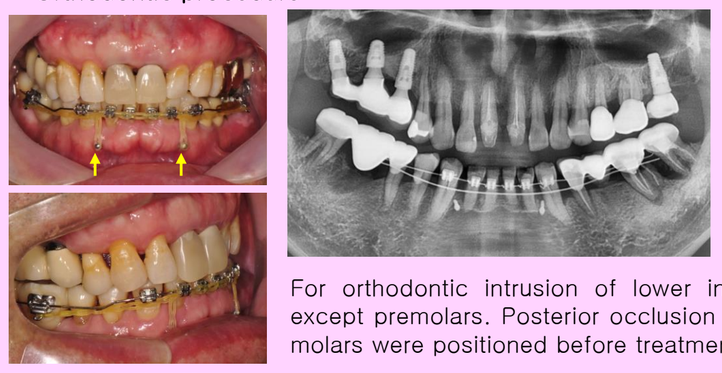
▪ Before treatment, periodontal chart





Before treatment, CAL were higher even where gingival margins seemed to be positioned normal due to alveolar bone resorption as shown in probing depth.

▪ Orthodontic procedure

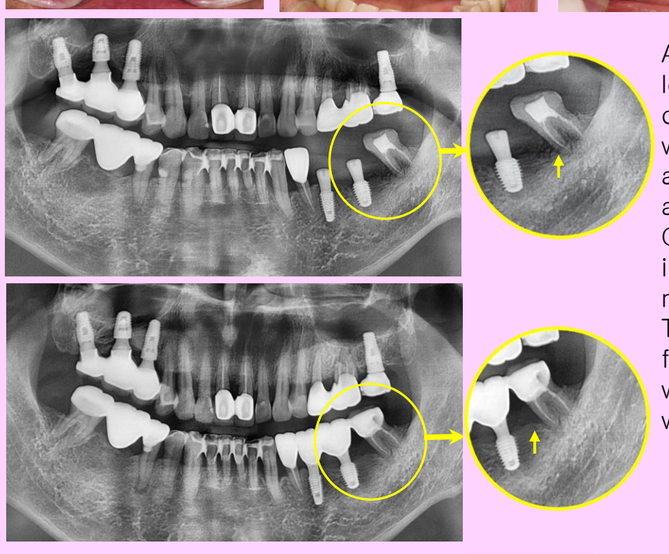


Micro-screws were implanted to intrude lower incisors. Intrusion force was applied labially from the center of resistance and tended to incline incisors' crown labially. Therefore, 2×4 power chain from 1st molar on both sides should be applied to prevent such an unwanted effect.

For orthodontic intrusion of lower incisors, brackets and tubes were bonded except premolars. Posterior occlusion should be maintained where premolars and molars were positioned before treatment.

After debonding, lower incisors were seen more than before treatment. Their gingival margins were lowered compared to premolars', as an absolute intrusion occurred.[4]

▪ After treatment
Permanent retention were important for maintain a long-term interincisal stability.
Indirect fiber reinforced composite splinting was bonded on lower 6 incisors.

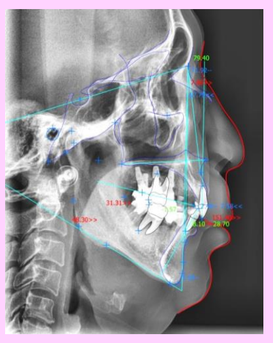


An implant dentist recommended to extract lower left 2nd molar because of mesial osseous destruction. But the flap operation with bone graft to be combined from both autogenous bone and xenograft saved it as an alveolar bone height increased.
Occlusal rest was formed distal to 1st molar implant to support a permanent crown of 2nd molar(not fixed nor bonded).
The indirect fiber reinforced composite and flowable resin splinting was bonded to restore worn teeth and support the lower 6 incisors with high CAL.

DENTURE

Measure Name	Mean	SD	10/26/2022	05/08/2023
Interincisal Angle (dg)	124.37	7.90	151.40 ***	151.77 ***
Md1 to NB (mm)	7.90	2.40	8.10	8.22
Md1 to NB (dg)	27.30	5.30	28.70	31.91

1. Upper incisors became invisible with aging as upper incisor edge placed above upper lip commissure. So, intrusion of upper incisors should be avoided.
2. After orthodontic movement, lower incisors were intruded and a little labially inclined(referred to Md1 to NB(dg).



Before tx.

Cephalometric superimposition

♠ Splinting ♣ Ridge augmentation

After debonding, lower incisors were seen more than before treatment. Their gingival margins were lowered compared to premolars', as an absolute intrusion occurred.[4]

Result

Good functional occlusion and facial esthetics were obtained even without extraction of any tooth which seemed to be hopeless. Over-erupted lower incisors were intruded to get space enough to restore worn incisor edges. These clinical cases showed that multidisciplinary intervention including orthodontics was necessary for full mouth rehabilitation especially in maximally preservative approach.

Discussion

The functional interference of a mutilated dentition was associated with mandibular retrusion, anterior crowding and passive eruption as well as severe CAL. Before final prostheses, a favorable basis for reconstruction should be achieved from multidisciplinary point of views. In the beginning, diagnosis and treatment planning were different depending upon dentist's subjective judgement. Long-time passive eruption and tooth wear could be treated with prosthesis and restoration without correction of vertical position of incisors, but normal overjet and overbite could not be achieved if much tooth reduction and endodontic treatment were not involved(maximally invasive approach).

Reference

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4. Proffit WR, Fields HW, Larson BE, Sarver DM. Planning comprehensive orthodontic treatment(absolute intrusion). Page 226. Contemporary orthodontics, 6th edition, 2019, Elsevier,