Rehabiltation Of Posterior Immediate Implants Using The Digital Protocol

Dr. Lanka Mahesh **Dr. David Morales Schwarz** **Dr. Praful Mehra**

Dr. Lanka Mahesh, is BDS, MBA, Diploma Hospital Administration and Diploma in Health and Hospital Management. He has masters Certificate in Implant Dentistry – UCLA, USA & CUFD, Thailand. He is an visiting Professor & Academic Director Post Graduate Education University of Murcia (UCAM) Spain. He is a fellow & Diplomate ICOI, USA and Fellow and member of Credentialing Committee WAUPS (World Academy of Ultrasonic Piezosurgery), Korea. He is an honorary Consultant to Armed Forces of India and has a Private Specialized Implant Practice in New Delhi.

Dr. David Morales Schwarz, DDS Universidad Pedro Henríquez Ureña UNPHU. He as Post-graduate in Periodontics & Oral Implantology, New York University (NYU). He is a Diplomate in Oral & Maxillofacial Implantology, University Paris XII Val de Marne. Director of Mastership in Oral Implantology, Universidad Catolica Murcia UCAM campus Valladolid, Spain. He is a scientific Director Bioner Implant Systems & has Private Practice exclusively devoted to Oral Implantology in Valldolid, Spain.

Dr. Praful Mehra, is a BDS, MDS (Prof.) Prosthodontics and Oral Implantology. He is a fellow ICOI (USA), PFA, ICD. Dip. Oral Implantology, European Bioner Academy, Spain. GBR & Sinus Masters Course – Univ. of Bern, Switzerland. Private Practice in New Delhi.

The ever evolving world of Oral Implantology has in the past few years yet again witnessed a digital revolution. This time it deals with digital impressions of implants captured via intra oral scanners.

This case report aims to highlight an immediate multiple implant case involving both arches wherein the entire rehabilitative process was done digitally.

Case Report

A 62 years old lady presented to the dental office with the chief complaint of difficulty in chewing due to multiple broken back teeth. On intraoral examination, the lady had a limited mouth opening and guided surgical implant placement was thus not contemplated. Root pieces were present in respect to tooth positions 15, 16 and 17 (Fig. 1 & 2). The sinus floor over the same is evident yellow line (Fig. 3)

Fig. 1 Intraoral view of 15, 16 and 17.
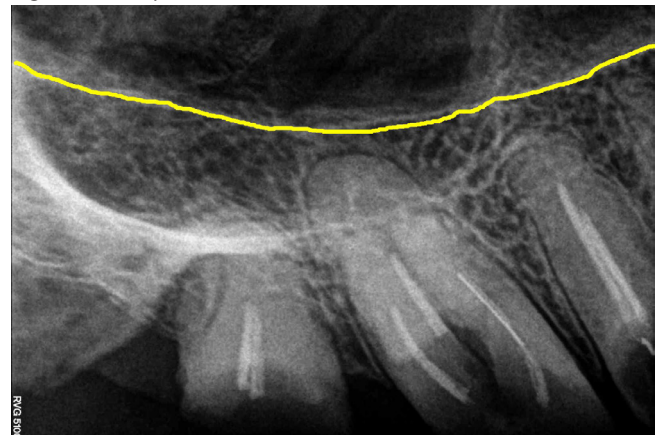

Fig. 2 IOPA X ray irt 15, 16 and 17.

Fig. 3 Sinus floor highlighted with yellow line.

In the mandibular left posterior region 35 and 36 root pieces were present. (Fig. 4) The patient was also adviced for removal of 37 but the patient was not interested till the implant rehabilitations were completed.
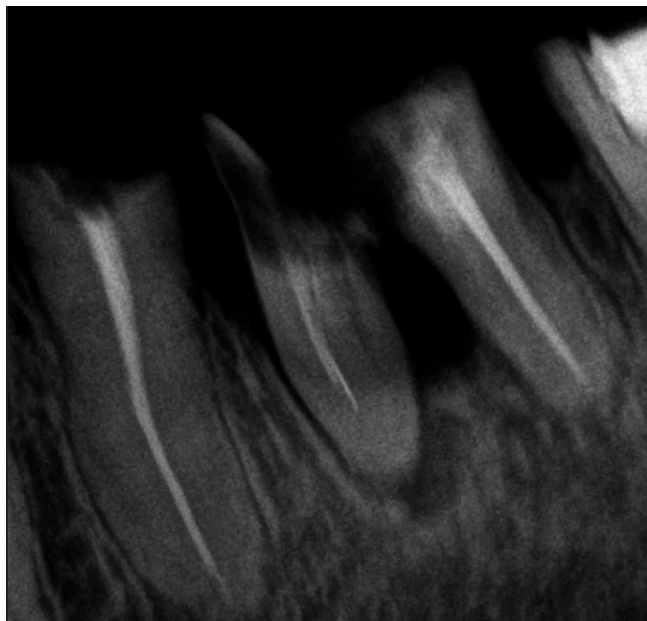

Fig. 4 IOPA X-ray of root pieces irt 35 and 36.

Atraumatic extractions were done in respect to 15, 16, 17 (Fig. 5) and 35, 36. Immediate Bioner Top DM **(Bioner Barcelona, Spain)** implants with double acid etched surface exhibiting a super hydrophilic surface were placed (Fig. 6). The implant sizes in 15, 16, 17 were 5/8.5mm respectively (Fig. 7) and in mandible the implant sizes in 35 and 36 were 5/10 mm (Fig. 8). Primary stability of 40 NCm was achieved for all implants. Submerged healing protocol was followed and the implants healed uneventfully in 3 months.
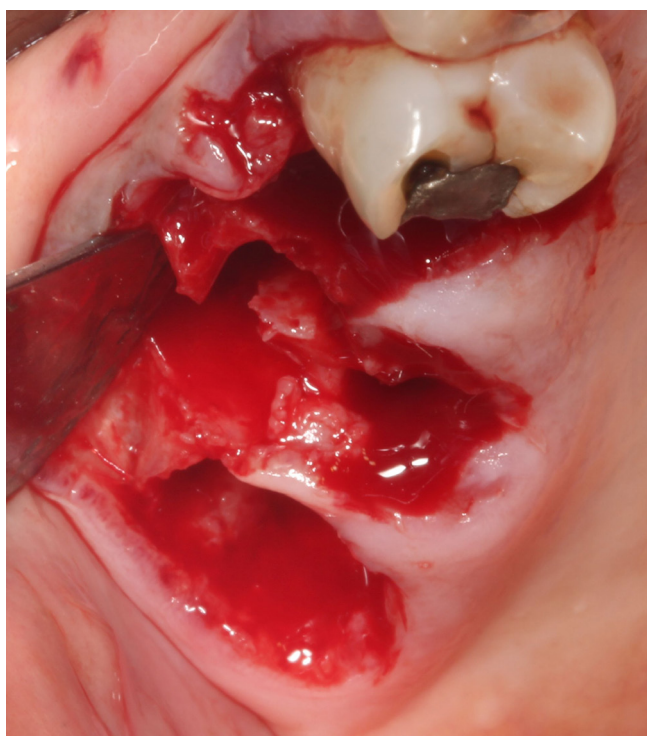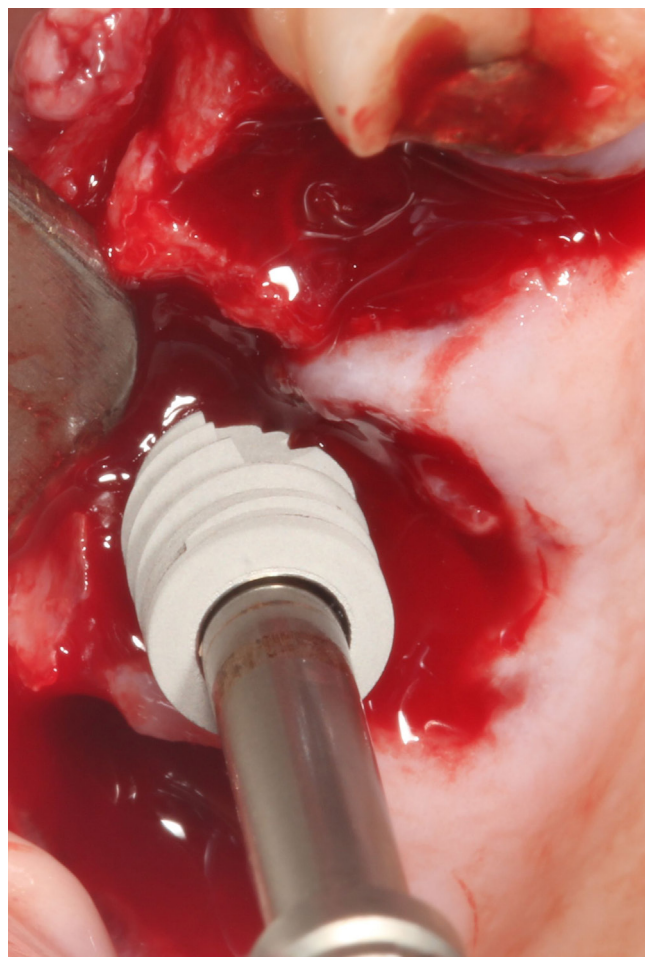

Fig. 6 Immediate Implant – Bioner Top DM being placed (Enhanced hydrophylic surface due to double acid etch surface).

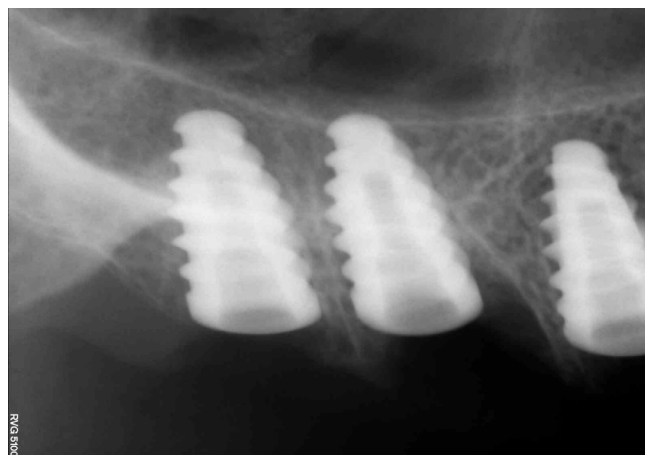*Fig. 5 Extraction sockets irt 15, 16 and 17.*

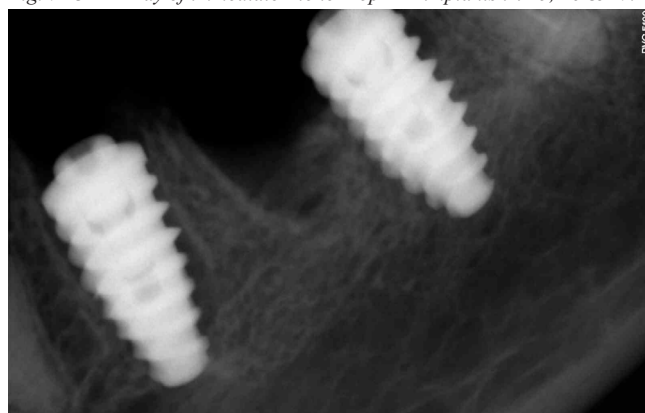*Fig. 7 IOPA X-ray of immediate Bioner Top DM implants irt 15, 16 & 17.*

Fig. 8 IOPA X-ray of immediate Bioner Top DM implants irt 35 and 36.

After 3 months, the implants were uncovered and straight multiunit abutments with 3.5 mm collar were placed and torque to 20 Ncm. The multiunit healing screw was placed and a waiting period of 2 weeks was followed.

Digital Rehabilitation Protocol

The first step towards Digital implant impression is to capture the intraoral implant position accurately and convert it into a 3 dimensional virtual position.

1. The healing collars over the MUA is removed and the Digital Scan Bodies of **Bioner** Multi Unit are hand tightened over the Multiunit platform via the prosthetic implant driver. (Fig. 9 & 10)

Fig. 9 Digital Scan Bodies - Maxillary arch.

Fig. 10 Digital Scan bodies – Mandibular arch.

2. Intraoral scan was done by **Trios 3 Shapes** and the positions of scan bodies was captured 3 dimensionally for both the arches. (Fig. 11 & 12) For this the scanner emitted structured light for the object to be digitized.[1,2] This light upon falling on the scan bodies or other intra oral structures undergoes deformation and is thus captured by the cameras of intraoral scanner. The processing software now calculated the spatial orientation in 3D coordinates and creates point clouds and meshes.[3] The reconfiguration and alignment of these 3D meshes and point clouds created a 3D virtual model.
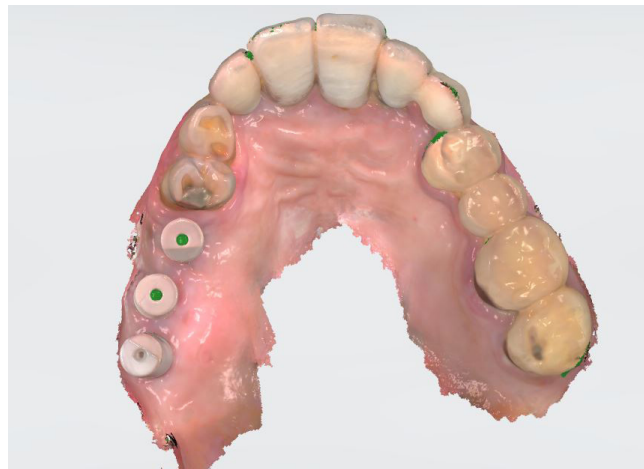

Fig. 11 Intra Oral Scan with Digital Scan Bodies - Maxillary arch.

Fig. 12 Intra Oral scan with Digital Scan bodies – Mandibular arch.

3. Next the multi unit scan bodies are removed and the implant platforms of multiunits are captured via intraoral scanner (Fig. 13 & 14) so these can be merged with the long multi unit scan bodies and virtual implant positions can be determined by the processing lab.
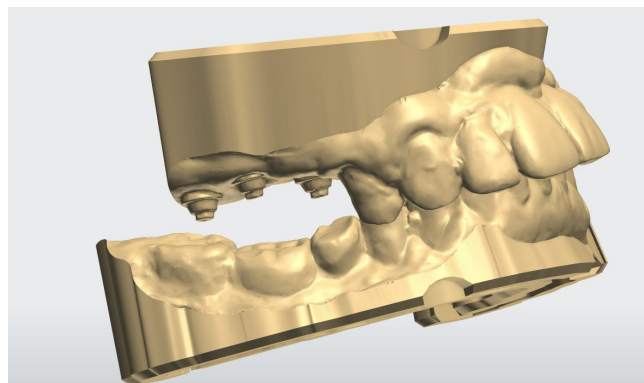
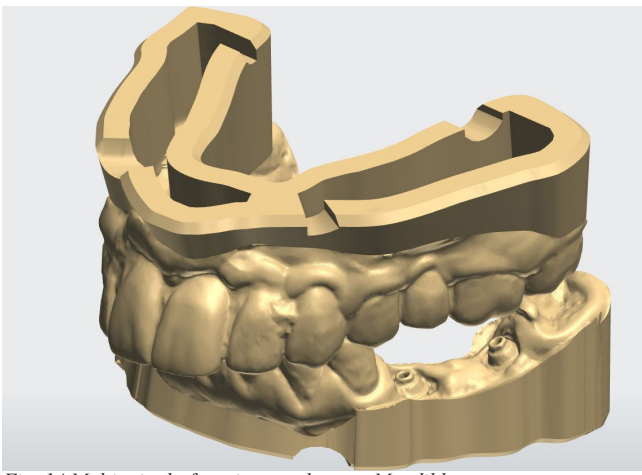

Fig. 13 Multiunit platform intraoral scan - Maxilla.

Fig. 14 Multiunit platform intraoral scan - Mandible.

4. Digital bite of the patient is also captured via the occlusion scan feature of intra oral scanner software.

Clinical Tip (Point 5)

5. Conventional Multi unit impression posts are placed intraorally and splinted with pattern resin for both the arches. (Fig. 15 & 16) Once the pattern resin sets these are removed and sent to the lab. These serve as a model verification jig so the 3D printed models in lab with digital analogs can be verified for their accuracy in the lab itself. This helps save multiple patient appointments.

Fig. 15 Splinted multi unit impression posts - Maxilla.

Fig. 16 Splinted multi unit impression posts – Mandible.

6. Patient shade is selected and the healing collars over the multiunit abutments is placed back till the next visit.

7. The 3D implant positions captured virtually (Fig. 17 & 18) are converted to 3D printed models and the digital analogs for all implant positions is secured (Fig. 19)
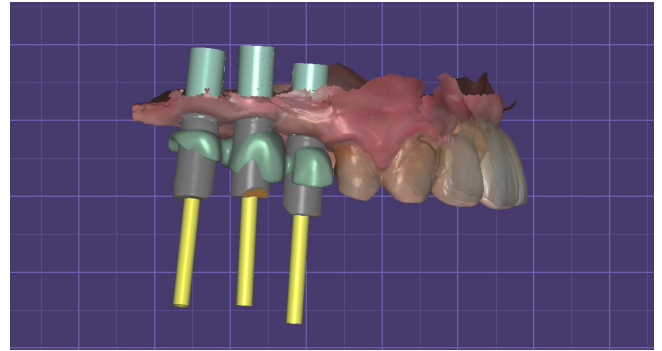

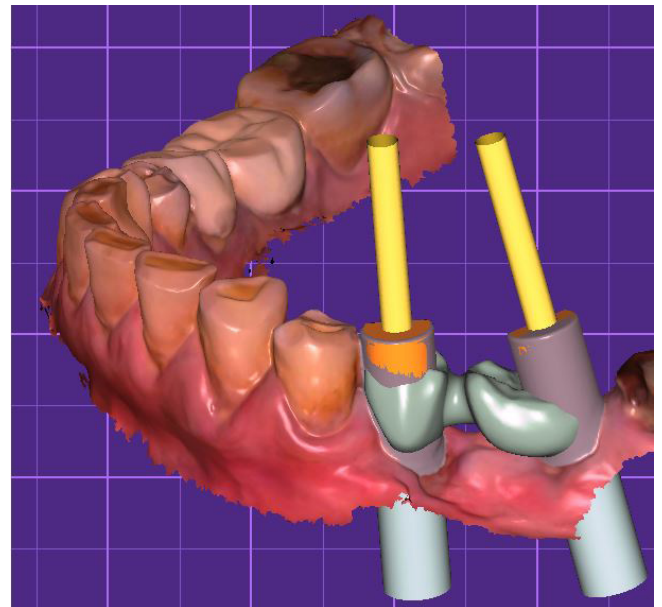Fig. 17 3 Dimensional implant positions – Maxilla.

Fig. 18 3 Dimensional implant positions - Mandible.

Fig. 19 3D printed models with digital analogs.

8. The clinical splinted conventional multiunit impression posts now enables the physical verification of the 3D implant positions on the printed model

9. The digital prosthetic design (Fig. 20 & 21) is processed in the lab and milled Co-Cr framework is made and layered with Vita Ceramic.
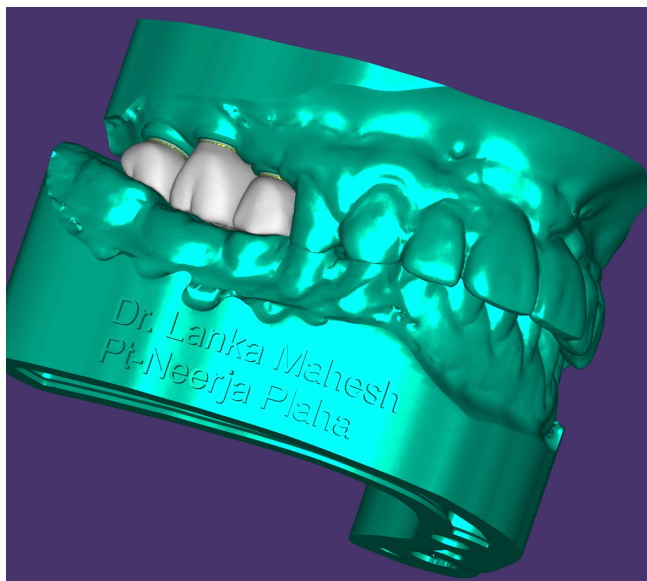

Fig. 20 Digital lateral view – Maxillary prosthesis.
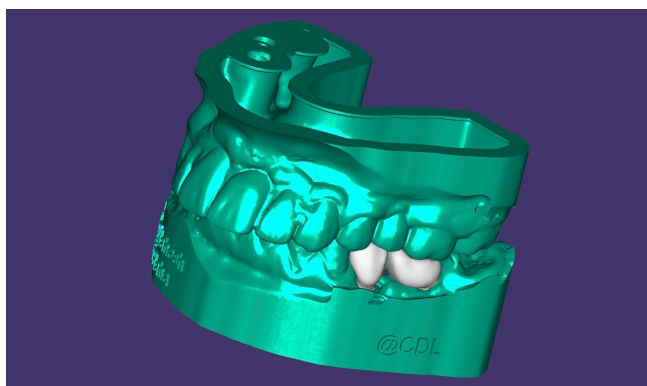

Fig. 21 Digital lateral view – Mandibular prosthesis.

10. The screw retained prosthesis is delivered on 3D printed models (Fig. 22 & 23) and occlusion is adjusted with no contact in centric, passive contact on clenching and no contact in laterotrusive movements. Verification IOPA X-rays are captured. (Fig. 24 & 25)

Fig. 22 Maxillary screw retained prosthesis on 3D printed model.

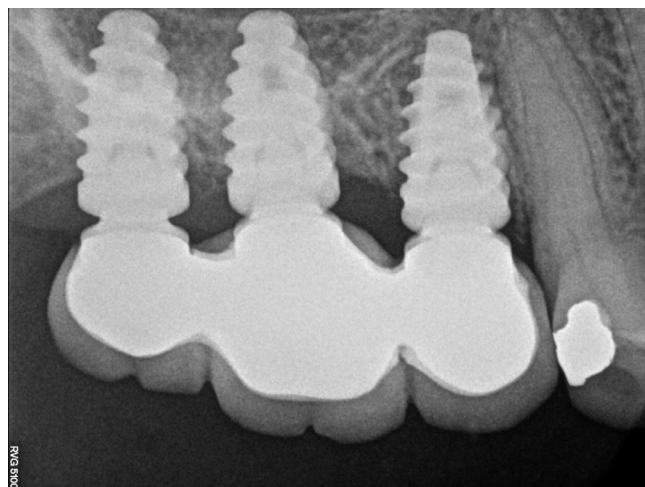*Fig. 23 Mandibular screw retained prosthesis on 3D printed model.*

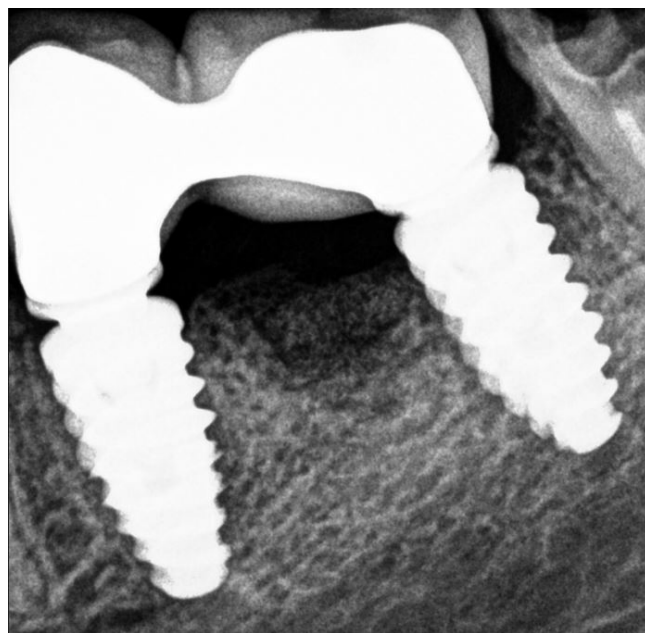*Fig. 24 IOPA X-ray – Maxillary prosthesis.*

Fig. 25 IOPA X-Ray – Mandibular prosthesis.

11. Screw access hole is sealed via teflon tape and composite. (Fig. 26 & 27)

Fig. 26 Occulsal view – Maxillary prosthesis.

Fig. 27 Occlusal view – Mandibular prosthesis.

Conclusion

Intraoral scanners for capturing the implant positions digitally has made a rapid progress. It is both convenient for the patient as well as the restorative dentist reducing the chair side time greatly. As this technology improves, it is definitely the future of implant prosthodontics.

Referances

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2. *Stimmelmayr M., Guth J.F., Erdelt K. Digital evaluation of the reproducibility of implant scanbody fit-an in vitro study. Clin. Oral Investig. 2012;16:851–856.*
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