Forensic dentistry case book 1: Dentures used to convict suspect

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CASE REPORT

An elderly woman was brutally murdered while visiting her deceased husband's grave. At the post mortem it was noticed that her dentures were missing. It was first assumed the dentures had been lost during the violent attack. During the subsequent investigation, a set of dentures was found hanging in the room of one of the suspects. The investigating officer reported the dentures were displayed as a trophy, together with other artefacts. Initially this was noted in the police report, but disregarded as being of major significance. During follow-up investigations, the victim's daughter reported that she had a set of disused dentures belonging to her mother. She had taken her mother to the dentist to fetch her new dentures and had kept the old pair which her mother no longer used or wanted. Both pairs of dentures were brought to the Forensic Dental Section of the Department of Oral Pathology and Oral Biology, School of Dentistry, University of Pretoria for analysis.

Both maxillary (Figure 1) and mandibular dentures were handed to us as evidence. We were asked if we could match the dentures in an attempt to connect the suspect to the crime scene. The fitting surfaces of the lower dentures were quite different and no obvious concordance was present.

The initial GISS (General Impression Shape and Size) of fitting surfaces of the maxillary dentures looked very promising and a full analysis was conducted. To compare the anatomy of the maxillary arches, Polyvinylsiloxane ISO 4823 Type 0 putty models were constructed from the two maxillary dentures (Figure 2). The three dimensional analysis of pattern association of dental features used in bite mark analysis, as described by Bernitz[1], was used to analyse the concordant features present. As the dentures were obviously quite different, but possibly from a common origin ,all aspects of warping, shrinkage and distortion had to be taken into account. This was done by using a mathematical affine transformation analysis technique of the features present.[2] The following is quoted verbatim from the forensic dental report submitted to the High Court by Bernitz:

"The dentures were clearly made several years apart which is evident from the differing extent of the natural resorption of the alveolar bony ridges, observed in both maxillary and mandibular arch ridges. The process of mandibular ridge resorption is commonly more advanced than that of maxillary ridge resorption, and was so advanced in denture FSB-xxx, that no specific features could be observed. Maxillary models showed several features which could be compared directly.

1. The general impression shape and size are similar.
2. Ridge shape is similar in the 24 to 28 ridge area, indicative of early extraction of teeth in this area of maxillary arch.
3. More pronounced ridge form from 23 to 17 ridge area, is indicative of later tooth extraction and is similar in both models.
4. The presence of rugae in the left anterior region of the palate is present in both models.
5. The lack of rugae in the right anterior region of the palate is present in both models.
6. The buccal bone resorption in the 17 area is simila.r
7. The asymmetric ridge form is simila.r
8. The ridge contour in the first quadrant is similar.
9. The ridge contour in the second quadrant is similar.
10. The palatal arch is similar.
11. The extent of resorption visible in denture FSB-xxx is more advanced than the resorption in denture in FSCC-xxx, which is consistent with the changes over time. It also concurs with the extent of resorption in the mandibular ridges."

ACRONYM

GISS: General Impression Shape and Size

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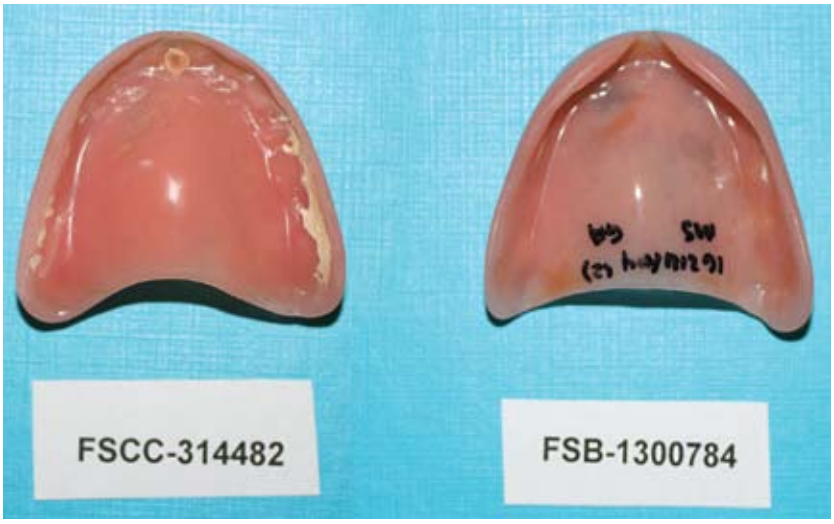

Figure 1: The two maxillary dentures

Figure 2: The two Polyvinylsiloxane models made from the maxillary dentures.

The conclusion of the forensic report read: "In the presence of multiple concordant features and no unexplained discrepancies, it can be stated with a high degree of certainty that both maxillary dentures were from the same individual."

DISCUSSION

This case is unique in our experience in that two dentures were compared to establish a common origin. The severe ridge resorption which had progressed in the mandibular arch, resulted in there being no identifiable similarities in the lower dentures, which were therefore not analysed. The upper dentures however, showed clearly defined features that could be matched and used to establish a positive concordance. No form of denture marking was present on any of the dentures examined. Marked dentures have been used for identification purposes in forensic dentistry for many years.[3-5] Several techniques have been used, including engraved or stamped metal or acrylic strips inserted into the acrylic of the denture, discs, simple engraving of denture base, microchips and printed strips.[3-7] It is important that dental practitioners mark all dentures made in their practices which will facilitate identification of burned and decomposed victims, identification of lost dentures in hospitals, old age homes and mental institutions and identification of dentures in dental laboratories and practices. In general dentistry and in forensic identification cases, it is desirable that the denture markings be clear and readable.

The denture evidence in this case played a major role in final conviction of the suspect, who received a life sentence for his involvement in the murder.

Declaration:
No conflict of interest declared.

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