Clasp Fatigue Study Review

Deformation and retentive force following \textit{in vitro} cyclic fatigue of cobalt-chrome and aryl ketone polymer (AKP) clasps\textsuperscript{1}

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\textbf{JOURNAL}: Dental Materials 35 (6) e113-e121 [2019]

\section*{INTRODUCTION}
Removable partial dentures (RPDs) are widely used to replace missing teeth. Cobalt chrome (CoCr) is perceived as the most popular material for RPD construction, but the material has limitations when used for clasps, including work hardening, distortion, and eventual fracture of clasp arms when stressed beyond their elastic limit.\textsuperscript{2-7} High performance polymers, such as aryl ketone polymer (AKP), have the potential to engage and disengage undercuts without being stressed beyond their limit.

\section*{PURPOSE OF THE STUDY}
Compare the retentive force of individual clasps made from CoCr or an AKP material (Ultaire\textsuperscript{®} AKP) following prolonged fatigue testing along ideal and non-ideal paths of removal and assess 3D deformation of the active and passive clasp tips.

\section*{STUDY DESIGN}
CoCr and AKP clasps were manufactured in their standard, respective processes, digitally scanned prior to testing, then cycled 15,000 times over an e.max analogue crown in artificial saliva. Retentive load was measured \textit{in situ}, as a function of cycles. Clasps were rescanned to assess deformation and along with their antagonists subjected to SEM to assess localised wear.

\section*{RESULTS}
\begin{itemize}
  \item Ultaire\textsuperscript{®} AKP clasps showed significantly less permanent deformation and a more consistent retentive force than CoCr clasps.
  \item Ultaire\textsuperscript{®} AKP demonstrated less clasp-to-clasp variability.
\end{itemize}

\section*{CONCLUSION}
Ultaire\textsuperscript{®} AKP clasps maintain shape with less distortion than metal. Unlike CoCr, the Ultaire\textsuperscript{®} AKP clasps did not work harden, nor did they have as large a reduction in retentive force and accompanying permanent deformation. The retentive force for the Ultaire\textsuperscript{®} AKP clasps was consistent over 15,000 cycles of fatigue-mimicking, prolonged clinical use. The AKP material was more robust, showing minimal deformation even in non-ideal paths of removal, as many patients would routinely use.
REFERENCES


