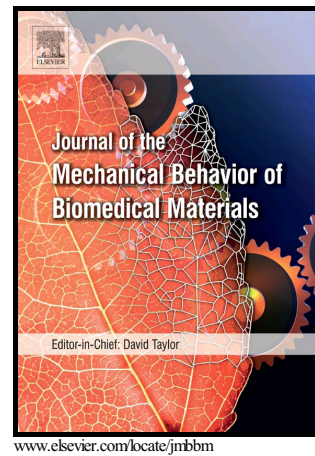


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Perforation Forces of the Intact Porcine Anterior Lens Capsule

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Abstract

During the first step of cataract surgery, the lens capsule is perforated and a circular hole is created with a sharp instrument, a procedure called capsulorhexis. To develop automated systems that can assist ophthalmologists during capsulorhexis, the forces required must be quantified. This study investigates perforation forces of the central anterior lens capsule in porcine eyes, which are used as a conservative model for the human eye. A micro-mechanical characterisation method is presented that measures capsular bag perforation forces with a high precision positioning and high-resolution force sensing system. The force during perforation of the anterior lens capsule was measured with various sized needles and indentation speeds and is found to be 15 – 35 mN. A bio-mechanical model is identified that describes an exponential correlation between indentation force and depth, indicating strain hardening behaviour of the porcine anterior lens capsule.

Keywords: Perforation force, Indentation, Force sensing, Anterior lens capsule, Porcine lens, Capsulorhexis

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