Periprosthetic Tissue Removal in Minimally Invasive Hip Refix Procedures

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An alternative to conventional revision surgery of loosened hip prostheses is a new minimally invasive refixation procedure. This procedure requires the removal of periprosthetic fibrous tissue. The aim of this preliminary study is to evaluate which technique is most suitable for minimally invasive periprosthetic tissue removal: a Ho:YAG laser or a VAPR-2 coblation system. The clinical situation of a loosened prosthesis was simulated by several cadaveric femora, each implanted with a hip prosthesis. Artificially created periprosthetic lesions were filled with a fibrous tissue substitute. Using this fibrous tissue substitute, we measured temperatures in vitro at different distances from the site of removal. Temperatures during removal were recorded both inside the fibrous tissue and in the surrounding bone. This study demonstrated that temperatures generated in the bone do not result in thermal damage. Temperatures inside the fibrous tissue are sufficiently high to remove the fibrous tissue. Using the laser instead of the coblation system for the removal of fibrous tissue resulted in higher temperatures, thus, a faster removal of fibrous tissue. Additionally, the laser takes less effort to be integrated with the new surgical instrument and, therefore, we consider it a promising tool. However, when translating the results to clinical practice, the limitations of this study should be kept in mind. The equipment was set to typical presets; different settings (pulse frequency, pulse energy, and activated time) might affect the procedure's success and risks. Care must be taken with respect to generated temperatures at larger distances from the place of removal. The use of the Ho:YAG laser, as well as VAPR coblation, might form a small risk for thermal damage to healthy surrounding tissues. Further research on apparatus settings and removal strategy is necessary before this technique can be applied for the removal of fibrous tissue in the clinical setting.

Device Process Integration: A New Device Fabrication Approach

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Microelectromechanical systems (MEMS) devices have gained considerable attention in medical and automotive applications due to their vast advantages in fault detection. However, the cost for MEMS devices has been a challenge for the device manufacturing industry due to the final packaging of the devices. It is considered expensive compared with device fabrication in certain applications. Majority of MEMS devices are still housing traditional packaging methods due to difficulty in handling and yield loss. The advanced interconnect solutions based on thin silicon carrier and through silicon via are being developed to interconnect integrated circuits and other devices at high densities. Can such technologies be used for MEMS device interconnections? It is really a challenge for MEMS designers and engineers due to the MEMS elements present in the devices. In this paper, we present a device fabrication process to realize interconnects that are fabricated prior to the MEMS elements are defined and processed in the device wafer. The interconnects are filled by doped polysilicon and device wafers with such prefabricated vertical interconnects can be used as the starting wafers for any device processing including optoelectronic and MEMS. The process details and their characterization are elaborated along with the physical and electrical analysis of such interconnections.