THE PERCUTANEOUS IMPLANT. THE EFFECTS OF DESIGN, HOST SITE AND SURGERY ON THE TISSUE RESPONSE

Avhandlingen baseras på följande delarbeten


II. Johansson ML, Hultén L, Peeker R, Jonson O, Thomsen P, Edwin B. Achieving stoma continence with an ileal pouch and a percutaneous implant. In manuscript


IV. Johansson ML, Eriksson, T, Omar O. The development and ex vivo evaluation of a novel drill system for bone conduction hearing implants. In manuscript.


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Abstract
This research project focuses on the multiple challenges associated with implants that breach the skin. The role of device design, host site, and surgical approach on tissue response and outcome are evaluated, experimentally and clinically, for both a stoma port and a bone-anchored hearing system (BAHS). Experimental studies implied the opportunity to integrate a soft-tissue-anchored titanium port with skin and intestine. However, the longevity was challenged by the presence of bacteria and mechanical strains [Paper I, II]. Applying a micro- and nanotopography to a bone-anchored implant, enhanced its biomechanical anchorage in comparison with a machined surface. Further it was found that removal torque was associated with the degree of bone-to-implant contact, whereas the implant stability, at retrieval, was correlated with the bone area [Paper III]. Bench tests demonstrated that during osteotomy preparation, the level and distribution of heat is affected by the drill design, and the drilling and irrigation procedure. Provided that the recommended, standard procedure is followed, the absolute temperatures using either a conventional drill system or a guided drill system are below the threshold for thermally induced tissue damage [Paper IV]. In human studies of BAHS, anaerobic bacteria, but not aerobes, were detected in the tissue already prior to installation. In contrast, after the installation of BAHS, both anaerobic and aerobic (predominantly S. epidermidis and S. aureus) bacteria were detected on the abutment, in the tissue and in the peri-abutment fluid space, at both three and 12 months [Paper V]. The feasibility of a novel, minimally invasive technique for installing BAHS was demonstrated clinically [Paper VI, VII, VIII]. In a randomized clinical trial, skin sensibility and cosmetics were significantly better and, surgery time and skin sagging was significantly reduced compared with the conventional surgical procedure. At three-months, no significant difference in incidence of inflammation was found between the techniques [Paper VIII].

It is concluded that the device design, host site, and surgical approach are important determinants for the tissue response and clinical outcome of percutaneous systems.