

Public Abstract

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Title:Development of Biological Hip Resurfacing in Dogs

Total joint replacement remains an excellent treatment for patients with debilitating joint degeneration and osteoarthritis. However, joint replacement using non-absorbable prostheses made of metal and plastic can deteriorate and become loose over time. A superior alternative would involve joint replacement with absorbable, biocompatible materials that facilitate re-generation of native tissues and that improve with time. Our objective with this research was to develop a hip replacement for application in dogs. Our work was focused in three areas. First, we successfully developed and produced a prosthesis made of an absorbable material, poly-epsilon-caprolactone (PCL) with mechanical characteristics that are similar to that of native bone. Second, we determined that use of a common sterilization technique, hydrogen peroxide gas plasma, rendered PCL toxic to native tissues although other sterilization procedures, such as radiation, did not render the PCL toxic to native cells. Lastly, we developed several steps in a surgical protocol for replacing the femoral head in dogs using the aforementioned PCL prosthesis. The progress that was made sets the stage for continued pursuit of PCL as a joint replacement material in the canine hip with the possibility that this will serve as a model for future research into use of PCL for biological joint replacement in people.