Polyetherketoneketone (PEKK), 3D Printed, Bipartite Surgical Implant: An Alternative and Supportive Cure for Internal Coxa Saltans in Female Adolescents

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Coxa Saltans, a condition of the hip, comes in three forms that manipulate a snap, but the contributing factors vary. Internal Coxa Saltans, on which this research focuses, occurs when the iliopsoas muscle-tendon snaps over bony protrusions on the front of the pelvis. The condition is commonly seen in female adolescents due to the hips growing faster than the muscle-tendon can accommodate. The muscle-tendon cannot span such a large area without complications. This results in a tight, inflamed iliopsoas that is prone to snapping. Basic treatment is administered and if the snapping persists and becomes increasingly painful, lengthening of the tendinous fibers of the iliopsoas muscle-tendon is performed. Research has shown that this method removes valuable support from the patient's hip joint. This research seeks to design, 3D print, and mechanically test a bipartite surgical implant that prevents the snapping and provides support for the patient. Using Solidworks, the two parts of the implant were designed, combining the properties of a doorstop and channel like mechanisms. The bipartite implant was 3D printed and then tested mechanically via an Instron machine. The implants were tested for compressive strength in different orientations. When tested mechanically, the femoral implant failed at a load of approximately 1,240 N and the pelvic implant failed at a load of approximately 720 N. Taking the general anatomy of the hip and the strength of the implants into account, it can be concluded that the implant design can provide required support to the hip, while also preventing the snapping.

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