Reduction of Surgical Site Infections with Coated Polyester Sutures

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Introduction: Surgical site infections (SSI) are one of the most common health-care associated infections and has an occurrence rate of 1%-3% of all surgical procedures, included abdominal surgeries.[1] Reductions of infection rate can be achieved with antibacterial drugs at the surgical site, one such drug being doxycycline hyclate. Another issue is loss of strength in the area surgery is performed, an example can be anastomotic leakage in patients undergoing colonic or rectal resection.[2] This is thought to be due to matrix metalloproteinase (MMP) activity, specifically MMP-9, by causing local matrix degradation in the tissue surrounding the sutures. Doxycycline can also act as a MMP inhibitor at a sub antimicrobial dose and inhibits tumor cell proliferation, invasion and angiogenesis.[3]

Specific Aims

Aim 1: Show proper coating of doxycycline and chitosan to surface of polyester suture
Aim 2: Demonstrate the antibacterial effect doxycycline has on the suture
Aim 3: Measure MMP inhibition affect doxycycline has

Methods: In order to determine successful coating of the doxycycline to the polyester surface, sutures are coated and then incubated in PBS for 24 hour cycles until drug release is no longer significant to determine how long the antibacterial properties will last. Bacteria assay using E. Coli (a very common bacteria in abdominal SSIs) will be done to analyze the zone of inhibition provided with the coating compared to untreated sutures. Then, MMP inhibition will be measured with human macrophage cell culture. Lastly, a rat model will be proposed in order to get *in vivo* results.[4]

References:

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