

Sponsor: UBC-Urology

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Introduction

Bladder cancer is managed initially by transurethral resection of the bladder tumour (TURBT). Whenever possible, we perform an “en bloc” resection where the tumour is kept completely intact throughout the resection. This is a safer technique than the conventional piece-meal resection because it avoids stimulation of the obturator nerve which can lead to bladder perforation, and it provides an intact specimen for more complete pathologic analysis, including assessment of surgical margins. The main barrier with this approach is the easy extraction of the tumour from the bladder. The tumour is typically larger than the instruments we have at our disposal, and often larger than the diameter of the urethra. There is currently no device designed to remove an en bloc tumour specimen from the bladder. The only established approach is to fragment a larger tumour into smaller pieces after the complete en bloc resection, but this destroys the biological architecture of the tumour, making it more challenging to assess pathologically, and it theoretically disseminates bladder cancer cells throughout the bladder. A device that could remove the tumour in one piece would greatly facilitate wider adoption of en bloc TURBT with all its associated advantages for patients, surgeons and pathologists. This would be the first device on the market for this purpose. If the device is effective, there is potential for larger scale production and distribution globally.

Brief Project Description

The problem with which we are faced is 2-fold. First, how can we design a device that can be easily controlled through a rigid cystoscope for containing the bladder tumour specimen. Secondly, what is the best way for removing the tumour specimen from the bladder without damage to the urethra. One idea would be to remove a larger tumour through a small incision into the bladder, but this type of cancer has a risk of seeding along the tract, and therefore, the tumour must be removed through the urethra. Prior attempts have been made using devices that we have available in the hospital including: rigid graspers, mesh basket (Roth Net®), and irrigation syringes. The tumour is usually too friable for the rigid graspers and

tears apart with rough handling. The mesh basket was difficult to control through the scope, since the diameter of the basket was large and its position could not be easily controlled. The basket was designed for removal of colorectal tumours removed endoscopically. The irrigation syringe is a blind maneuver which did not provide enough control to aspirate the specimen through the cystoscope.

Expected Outcomes

The expected project completion would take the form of a prototype device that could be tested in a simulated setting, and potentially be sterilized and trialed with patients in the operating room if the design progresses far enough during the timeline.

Resources Available from the Customer

The student will have support from both a staff Urologic Surgeon and Urology resident to assist in prototyping and brainstorming ideas for the prototype. We would provide access to existing urologic equipment to give context to the current need, and we would invite the student to enter the operating room to observe TURBT surgeries first hand. Prototypes and ideas would be reviewed and assessed for usability by the urology team. Adequate funds are available to cover prototype development.

Customer Requirements

Must Have: Able to be sterilized; easy to use

Nice to Have: Inexpensive

Maybe: Reusable

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