

Case Report

Use of the radiofrequency Caiman[®] Aesculap[®] Grasper in three different laparoscopic urologic procedures with video

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Abstract

Introduction: The Caiman grasper is a radiofrequency instrument that allows cutting and sealing of tissues and blood vessels, with the added benefit of a distal closure that allows a stable pressure in its 26.5mm long tip, with a less than 1mm thermic injury of the adjacent tissues, with energy regulation depending on the tissue characteristics, allowing to seal up to 7mm vessels. All the above makes dissection easier and diminishes surgical time, making the laparoscopic procedures safer and faster, including urologic surgeries.

Objective: We present a video with three different urologic laparoscopic procedures with this radiofrequency grasper as an initial experience.

Material and methods: This less than 8-minute video includes: a transperitoneal laparoscopic vesico-bladder fistula repair due to an iatrogenic obstetric hysterectomy, the second part is a transperitoneal laparoscopic radical nephrectomy of a central kidney cancer, and finally an extraperitoneal radical prostatectomy. All the surgeries were performed using the CAIMAN[®] grasper.

Discussion: Even though this is the initial experience with this CAIMAN[®] sealing grasper, it proved to be efficient in upper and lower urinary tract surgeries, making the procedures safe and faster.

Conclusions: The CAIMAN[®] grasper is a useful laparoscopic instrument for vascular control, dissection and opening of the upper and lower urinary tract, with a mixed use of cutting and grasping instrument, which might make these and other procedures easier and more efficient.

Introduction

The use of energy based instruments in laparoscopic surgery is one of the main improvements in current urologic surgery, mainly because a bloodless procedure will not only benefit the patient, but make the procedure better because of adequate visualization of the tissues and does not diminish the light and visibility of the surgical field, but also because, less time is spent in controlling bleeding vessels. Therefore, several instruments are constantly being investigated and implemented.

Initially only monopolar electrocautery was available, but it caused a lot of peripheral electric damage, vapor that diminished the visibility, as well as carbonization of the surrounding tissues with a limited effect on medium and large blood vessels. This was later modified with bipolar graspers, that allowed the energy to be more focused, diminishing surrounding tissue damage. Latter ultrasonic instruments allowed sealing larger diameter blood vessels and diminished carbonization of the adjacent tissues with no vapor to obstruct visualization, and thanks to the integrated knife a central cut was obtained [1].

Comparative metaanalysis of the different coagulation and cutting instruments are scarce, and the type of studies make it difficult to reach a conclusion, because of the several types of surgical procedures, tissues, blood vessels and analysis. All the above is even more difficult if we take into account, that surgical procedures are always different depending on the patient, the surgeon experience and previous scar tissues. However, ultrasonic energy might be safer and as effective as electro-surgical energies [2].

If we consider the advantages of coagulating-cutting instruments an added use should include the adequate grasping capacity, which

are the benefits of the Caiman grasper. Concerning the diameter of the blood vessels that can be sealed and the pressure that this seal can tolerate without reopening the tissue that has been cut is another key component of this equipment. Another advantage is the gas that is liberated during the sealing procedure that does not block the vision during laparoscopic procedures. Additional to its security is the diffusion of the energy to adjacent tissue that must not be damage and avoid injuries during surgery. Finally, the temperature reached on the sides of the instrument must be low in order to diminish the risk of burning tissue after its activation or during its use and the time for it to adequately cut and seal the vessels must be short in order to avoid long surgical times. All of the above characteristics of these coagulating-cutting instruments will impact on the bleeding volume, surgical time, complications, postoperative pain and transfusions [3].

CAIMAN[®] Aesculap[®] grasper is an electro-thermic bipolar cutting grasper with a 26.5mm length of closure that allows a firm grip of the tissues with an initial distal closing tip that prevents that the material to be cut does not slip out of reach, with the added benefit that the closing

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pressure is homogeneous making the sealing equal along the grasper length, thanks to a retro alimentation of the density of the tissue that modifies the energy used, and the diffusion of the heat around the Caiman is less than 1mm with little carbonizing of the surrounding tissues [4].

Objective

This paper shows the initial experience of the CAIMAN® Aesculap® grasper in three different urologic surgeries in the upper and lower urinary tract, and it includes an 8-minute video showing the critical periods of cutting and sealing of the retroperitoneal structures and the bladder and periprostatic tissues; in order to show the benefits of this grasper that impact on the speed and safety in laparoscopic procedures.

Cases

Vesico vaginal fistula

26-year-old female, with a history of cholecystectomy with 5 pregnancies and 4 C-sections with only one kid alive. She was submitted to a Cesarean section with heavy trans operator bleeding, resolved with an obstetric hysterectomy, with a bladder injury and right ureter ligation, which was repaired with reimplantation of the ureter and bladder closure in three stages during the same surgery. However, she started bleeding again 8 hours later, and was managed with transvaginal aleatory sutures by the gynecologist. She was discharged without complications and 25 days after the surgery she had transvaginal urine. The physical exam showed a vesico-vaginal fistula (Figure 1), that initially was managed with Foley catheter and antimuscarinics for 2 months, without resolution of the fistula, she was submitted to a transperitoneal transvesical laparoscopic fistulectomy using the Caiman grasper, with a surgical time of 90 minutes and 50cc of bleeding, she was discharged 2 days later and a Foley catheter was left for 15 days, resolving the fistula with no recurrence after 12 months of follow-up.

Transperitoneal radical nephrectomy

A 42-year-old male with medical history of hypercholesterolemia treated with atorvastatin and vasectomy. He had a renal lesion seen during a check-up ultrasound that reported a hyperechoic occupying mass in the right kidney, confirmed by the CT scan as a solid hypercaptating tumor in the central portion of the right kidney (Figure 2). This was associated with 5 red blood cells per High power field in the urine exam. Because of the above he was submitted to a transperitoneal radical nephrectomy using the Caiman grasper, with a total surgical time of 90 minutes, 100cc retrograde bleeding from the kidney and 36 hours later he was discharged. The pathology report diagnosed a 3.2cm Fuhrman III clear cell carcinoma in the central portion of the right kidney, with punctual invasion of the calices with negative surgical margins, confirming the stage of T1b, N0, M0. During his follow-up 1year later he remains free of recurrence.

Laparoscopic extraperitoneal radical prostatectomy

A 68-year-old male with a history of vasectomy, lumbar hernia and hypertension treated with metoprolol and hydrochlorothiazide. He had a bladder stone treated by another urologist with cystolithotomy without any prostatic intervention. After his lower urinary tract symptoms increased, he was evaluated in our office with an international prostate symptom score of 6 and a prostate specific antigen of 10.7 ng/dl. Because of the above he was submitted to a transrectal bipolar resection of the prostate with transrectal ultrasound guided

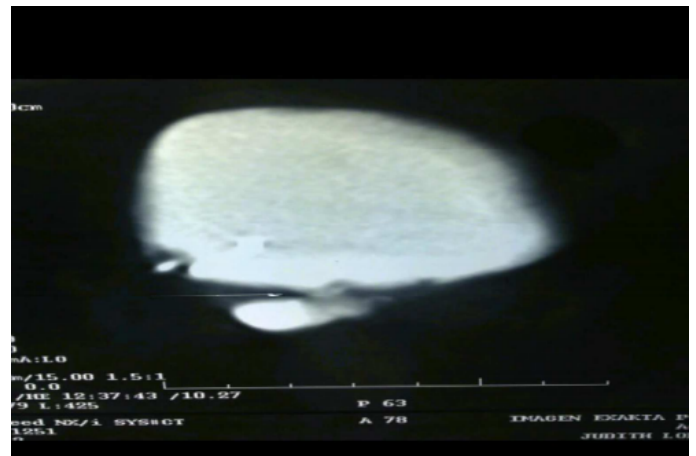


Figure 1. Cystography and CT scan showing the passing contrasted urine from the bladder to the vagina, diagnosis the vesico vaginal fistula in the posterior portion of the bladder near the vaginal dome

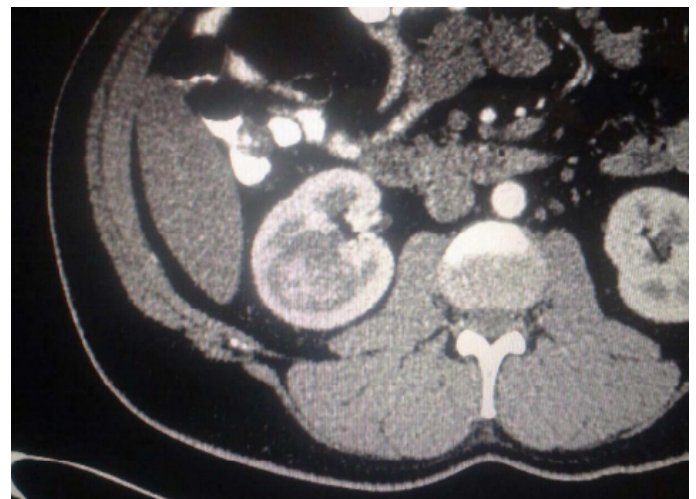


Figure 2. CT scan showing a solid hypercaptating mas in the right renal hilum which is compatible with clear cell carcinoma in direct contact with the renal pelvis and near the artery and vein, making a nephron sparing nephrectomy impossible

simultaneous biopsy, that was diagnosed with an adenocarcinoma of the prostate Gleason 4+4 in the left apex. Two months later he had an extraperitoneal radical prostatectomy performed uneventfully, in a 150-minute procedure with 200cc total bleeding and a 72 hours hospital stay. He was discharged with a final pathology report of an acinar adenocarcinoma of the prostate Gleason 3+3 with focal invasion of the capsule with 11 negative lymph nodes, classifying him as a T2c, N0, M0. Unfortunately, briefly after his discharge he was submitted to an upper gastrointestinal endoscopy because of vomiting, with an extensive bronco aspiration that caused his death due to a severe case of acute progressive respiratory insufficiency syndrome.

Discussion

Current bipolar and ultrasonic laparoscopic instruments allow adequate surgical dissection without bleeding thanks to the satisfactory vessels sealing without injury to the surrounding tissues [5], and tend to diminish the surgical time because of their efficacy [6]. Among the available equipment in the market are the Harmonic scalpel™, Ligasure™ and Trisector™, with an average functioning time that varies from 3 to 11 seconds, with vessel sealing diameter from 3 to 7 mm, and shutting pressures to rupture of the blood vessels from 363 to 536mmHg [7].

The CAIMAN® grasper has similar characteristics shown in laboratory studies that prove a closing pressure of 0.6 to 1.2MPa, that compared to the other equipments, with the benefit of being an homogeneous seal in the complete extension of the grasper, without slipping of the material grabbed at the tip, because of the initial closure at the distal portion similar to a crocodile, which gives it its name, and the advantage that when performing the surgical procedure it is unnecessary to change for grasper clamps when the cutting feature is not needed [4].

All of the above features are essential during surgical procedures to avoid bleeding and delaying the progress of the surgery. Personally, I have felt that the Cayman grasper, could diminish the surgical time because it avoids changing from scissors to graspers, because it can function as both with excellent sealing capacity when cutting. However, further clinical studies are needed to analyze how its use impacts the surgical time, complications, transfusion rates and bleeding. This study can be difficult because it is not only the instruments but the surgical expertise which allows the surgeon to choose the less vascularized tissues to do the surgical dissection [8] and individual anatomical difficulties which make each surgical procedure different and involve several variables to analyze [9]. Because of this, it will be difficult to individualize the impact of the grasper in a multivariable environment involved in a successful surgery.

Another rarely mentioned aspect that affects the result of a surgery is the distraction of the surgeon while performing the different surgical steps [10,11], by this we mean the difficulty of different maneuvers involved when operating a grasper. We feel that the Cayman grasper is very easy to use and does not involve significant effort to use it, diminishing again the time and distractions during the procedure.

The objective of this paper is to report the initial experience with the Cayman grasper in different laparoscopic procedures of the upper and lower urinary tract, as well as our personal experience with this instrument. It is important to highlight that further large-scale studies are needed to confirm our assumptions.

Even though it appears that novel surgical instruments can improve significantly the end results, there are several studies that do not show a significant difference concerning the surgical result, oncologic control or function recovery [8]. We consider that these instruments make the procedures easier and using less instruments because of dual functions (grasper and cutting) does impact the surgical procedure not only in less blood loss but also faster and easier progression of the surgery. And again, a double blind, prospective, well designed study should confirm this.

Conclusions

The CAIMAN® Aesculap® grasper has the benefit of allowing adequate strength to function as a grasper during the dissection of the

tissues and has a good length of sealing and cutting capacity without damaging adjacent tissues, making it a good option for laparoscopic urologic procedures. It might also diminish the surgical time, difficulty and bleeding, however further studies should be done to confirm this.

Disclosures

No grant or economic support was used in this paper. No industry participated in this paper and none of the authors has any commercial associations that might create a conflict of interest with this paper

Patient confidentiality

The three patients were read the informed consent and signed and approved the use of the surgical video for this publication.

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