The surgery was performed as follows:

* An 8cm vertical incision was made through the skin and fascia of the animal in the shaved region of the right paralumbar fossa.
* A mayo scissors was used to blunt dissect the skin around the area to allow easier manipulation of tissue.
* The scissors was then used to cut through the three layers of muscle: the external abdominal oblique, internal abdominal oblique and the transversus abdominis (outer to inner layers respectively).



 *Figure showing incision in right paralumbar fossa.*

* At this point, the duodenum was seen under the mesentery right after the incision point of the transverses abdominis.
* The mesentery was cut and the duodenum palpated until the foreign body was found.
* This segment of intestine was exteriorized and extra drapes were placed around the incision site to “wall off” the abdominal opening from any possible spillage and contamination resulting from the surgery.
* Intestinal contents surrounding the foreign body were milked to at least 5cm either side of the object and the intestines were clamped using a doyen intestinal forceps (alternatively, an assistant can use his middle and index fingers to clamp the intestines). This clamping was done to prevent any intestinal content from spilling through the incision.

 

 *Figure showing the clamping of the intestinal lumen.*

* The scalpel blade was used to make a linear incision into the lumen of the intestine directly above the foreign object. The direction of incision was longitudinal (same direction as the intestinal wall).
* A forceps was used to remove the foreign object and gauze was used to clean the contents of the intestinal lumen.



* The incision was then closed by first pulling together the points furthest away from each other and placing a simple interrupted suture using 4-0 vicryl.
* Four further simple interrupted sutures (using the vicryl) were then placed either side of the initial suture and a simple continuous suture was then done along the line of closure to provide added reinforcement of the intestinal wall.

\*it should be noted that horizontal mattress sutures could have been used instead and, in most instances would be preferred as they provide more stability.



 *Diagram showing placement of horizontal mattress sutures along the incision site and the direction of apposition of the incision.*

* A fine needle and syringe was then inserted 1 cm away from the incision site and saline was injected into the lumen to test the patency of the suture closure. Any leakages were noted and simple interrupted sutures were placed at these points.
* The outer wall of the intestine was then cleaned with saline and the structure was replaced into the abdominal cavity.
* The transversus abdominis was then closed along with the mesentery using catgut and a simple interrupted suture pattern.
* The other muscle layers were then closed together also using simple interrupted sutures.
* Finally, the skin of the animal was apposed using a for interlocking suture pattern and nylon suture.
* The wound was cleaned with a saline soaked piece of gauze and was sprayed with an adhesive bandage spray and larvicid around the initial spray.
* The fluid line was locked off and the catheter was removed.
* The animal recovered from the anaesthesia almost immediately and was placed in a clean holding pen for post-operative monitoring.

Pre-operative considerations:

A physical examination was done to aid in the assessment of the anaesthetic risk of the patient. This is essential to minimize any complications which may arise for any procedure since the surgical team could plan for possible complications. Proper asepsis was ensured by scrubbing the surgical site and the surgeon’s hands and arms for the surgery. Proper attire (scrubs, drapes, hairnet, face masks and gloves) was also used to prevent any contamination. The analgesic was given prior to beginning the procedure so that the drugs could be incorporated into the body faster and be effective at reducing pain during the procedure. The antibiotic was also given so as to allow bactericidal activity during the procedure.

The dosages for epinephrine and fluid rates for shock therapy were calculated for the animal in case there was need for them to be administered. Before any drug was given, calculations for each drug were done and verified to be correct, and as for each procedure. It should be noted that in doing each calculation for these and other drugs it was ensured that dosages were kept below half of the toxic dose for each respective drug. This safety precaution was taken o decrease the chances of encountering an individual which may have a greater sensitivity to the drug than others.

Intra-operative considerations:

Ketamine 10% and xylazine 2% were added to the fluid bag to facilitate prolonged anaesthesia during the operation. The fluid rate was adjusted and monitored accordingly (increased if the animal showed signs of waking up, lowered if it was felt that the animal was too deep). Heart and respiratory rates were also checked every ten minutes to ensure the animal was not having a negative response to the surgical procedure.

Extra drapes were placed close to the surgical site to prevent any luminal contents spilling into the abdomen. Had this happened, the animal could have contracted a severe peritonitis and died. The syringe of saline was injected into the lumen to ensure the lumen was fully closed again to ensure that no spillage of intestinal content occurred as this would have possibly led to peritonitis.

The lumen was closed by apposing the most distal portions of it so as to increase the luminal diameter at that point. The stitches would automatically decrease the diameter if done normally thus, it was closed in that direction.

Post-operative considerations:

The sheep was given 1mg/kg 5% flunixine meglumine daily for the first three days post-operatively (day 1= the day of surgery) and pen-strep was administered at 10000 IU once every three days post operatively for the first week. The animal’s TPR was monitored on a daily basis and the wound was checked for proper healing while larvicid and tetravet sprays were used every two days post operatively.