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Working

UC Davis - Vertical Sleeve Gastrectomy

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Mouse Metabolic Phenotyping Centers
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ABSTRACT

Summary:

Vertical sleeve Gastrectomy (VSG) is a common surgical treatment of obesity, type-2 diabetes, and other comorbidities of obesity. The VSG mouse surgical model provides researchers with a mechanism to evaluate mechanistic studies to explore the methods by which VSG bariatric surgery produces beneficial effects on obesity. The surgical procedure is performed under sterile conditions in accordance with AAALAC standards. Surgical animals will be able to ship 2 weeks after the post-operative monitoring period is completed. Cohorts of Vertical Sleeve gastrectomy (VSG), a pair fed SHAM, and an ad lib SHAM will be provided with each cohort ordered.

EXTERNAL LINK

https://mmpc.org/shared/document.aspx?id=262&docType=Protocol

MATERIALS

NAME	CATALOG #	VENDOR
0.9 % Sodium Chloride Injection USP	NDC0264-4001-55	B.Braun Medical Inc
4 x 4 non-woven gauze	LS2380	Veterinary Medical Central Services
2 x 2 non-woven gauze	LS2360	Veterinary Medical Central Services
20 cc syringe - Monoject	NS0440	Veterinary Medical Central Services
6-inch Non-sterile cotton swabs	23-400-101	Fisher Scientific
3-inch Non-sterile cotton swabs with pointed tip	23-400-118	Fisher Scientific
6-0 PDS suture noncutting needle (BV-1 taper double armed)	Z117H	Ethicon
7-0 PDS suture noncutting needle (BV-1 taper double armed)	Z135H	Ethicon
Meloxicam SR (2 mg/ml)	Meloxicam SR (2 mg/ml)	Zoopharm
Baytril (Enrofloxacin) 22.7 mg/ml	2900-RX	Heartland Veterinary
70% isopropyl alcohol		
Betadine surgical scrub		
Betadine solution	AJ159701	VWR international Ltd
Sterile drape	88VCSTF	General Econopack (STERIS Life Sciences)
Clippers – Oster mini clipper	RS5903	Roboz
Tissue glue	31477	Butler Schein (Henry Schein)
Isoflurane USP	017579	Butler Schein (Henry Schein)

NAME	CATALOG #	VENDOR
Handheld cautery	RS300	Roboz
Hemostats	RS7117(curved) RS7116(straight)	Roboz
Micro-serrefines 18055-03 (straight)18055-05 (curved)	18055-03, 18055-05	Fine Science Tools
Micro Needle Holder	12075-14	Fine Science Tools
Spring Scissors	15024-10	Fine Science Tools
Scissors Iris	14058-09	Fine Science Tools
Dumont Forceps	11270-20	Fine Science Tools
Micro Adson with fenestrated handle serrated	11020-12	Fine Science Tools
Olsen-Hagar needle drivers	12002-14	Fine Science Tools
Gavage needle	18061-75	Fine Science Tools
Curved iris scissor	14079-10	Fine Science Tools
Bead sterilizer (Germinator 500)	GER-5287-120V	Braintree Scientific
Stereomicroscope	GC01650	Microscope Depot
Surgisuite Multifunctional surgical platform	Surgisuite	Kent Scientific
Isoflurane vaporizer	Mobile Laboratory Animal Anesthe	VetEquip

MATERIALS TEXT

Note:

B Braun Medical, Cite this, (**B Braun Sharing Expertise, RRID:SCR_007148**)
Fisher Scientific, RRID:SCR_008452

1 Preparation:

1. Animals should be fasted overnight to ensure that their stomach and intestines are as empty as possible.

2. Weight prior to surgery to calculate drugs (Meloxicam and Baytril dosing)

3. Autoclave all supplies and tools needed for the surgery, start the bead sterilizer for sterilizing instruments.

4. Prepare sterile field surrounding the microscope and surgisuite surgical platform. Turn on warming field.

5. Prepare sterilized supplies onto the sterile field that will be needed during the surgery.

6. Anesthetize mouse using isoflurane induction chamber 5% to effect. Once animal is unconscious they may be moved to the prep area and maintained under 1-1.5% isoflurane. Artificial tear salve is placed on each cornea to protect from drying.

7. Prepare the animal by clipping the hair from the surgical site (The length of the areas is from the knee to the armpit area and the width should cover the entire ventrum).

8. Perform a surgical scrub on the incision area using an initial wipe of Betadine surgical scrub followed by 70% alcohol working from the intended incision line outward. Continue preparing the surgical incision site by doing three successive scrub of Betadine solution followed by 70% alcohol using clean cotton tipped applicator for each application.

9. Administer Meloxicam SR 2 mg/kg subcutaneously in the rear dorsal area.

10. Spray the incision area using betadine solution before transferring the animal to the surgical area.

11. Surgeon will then wash and dry hands using soap and water and don sterile surgical gloves.

2 Surgery:

Stomach Isolation

1. Make small vertical midline skin incision from just below the xiphoid process the mid abdomen at the height of the top of the hip.

2. Cut along the linea alba from the xyphoid to just below the umbilical region

3. Gently using your gloved fingers or sterile cotton tip applicator, pull the intestine away to expose the stomach

4. Using a dry sterile cotton tip applicator gently place the applicator under the median and left liver lobes and under the stomach to elevate the stomach through the incision

5. Using a sterile cotton tip applicator bluntly dissect away the ligamentous fat from the stomach and tuck it back into the abdomen freeing all connections between the stomach and the liver

6. Remove the ligament to the liver that sits in the lesser curvature of the stomach using small iris scissors

7. Remove the ligament connecting the fundus to the body wall using small iris scissors

8. Place a cotton tip applicator under the fundus to elevate the vascular gastrosplenic ligament connection that attaches to the fundus.

9. Once the vascular connection is clearly exposed use the electrocautery to fuse the vascular connection and free the stomach

Vertical Sleeve Gastrectomy

1. Once the stomach is isolated, moisten the stomach and intestine with sterile saline using the gavage needle

2. Be careful not to pull the stomach out of the body cavity as this can injure the vagus nerves located here. Be careful of the pancreas attachment to the pyloric portion of the stomach. Avoid manipulation of this area.

3. The objective of the surgery is to remove 75-80% of the stomach

4. Place the isolated stomach on a 2 x 2 gauze and irrigate with sterile saline to prevent drying

5. Make an incision using the micro-scissors along the avascular seam of the greater curvature of the stomach from the right of the esophagus to where the pancreatic vessels attach to the stomach.

6. Using a cotton tip applicator gently remove the stomach contents from the stomach incision onto the gauze

7. Replace the gauze and flush the stomach area with sterile saline

8. Replace the gauze with a fresh wet piece of gauze

9. Using sterile 7 French Polyethylene tubing, size the gastric pouch remnant from the esophagus to the pylorus

10. Using 7-0 PDS suture close the stomach at the edge of the sizing with the 6 French tubing using a simple continuous suture through both layers of stomach wall creating a diagonal line from the right of the esophagus to the connecting vessels of the pancreas. This leaves approximately 1/3 of the stomach cranial to the suture line.

11. Keep the remaining length of suture attached to close the stomach after removal of stomach tissue

12. Using micro scissors, cut away the portion of stomach tissue distal to the suture line being careful not to cut any of the previously laid suture material

13. Closure of the stomach is done using 7-0 PDS in a continuous mattress pattern moving from the pancreatic vessels to the esophagus.

14. Additional single interrupted suture are used if any gap areas are noted

15. The remaining stomach pouch should have a lumen diameter sized to 6 French and approximating 20-25% of the original stomach area

SHAM Vertical Sleeve Gastrectomy

1. Once the stomach is isolated, the stomach will have a gentle pressure applied using a pair of hemostats at a location that is approximately 2/3 cranial to the greater curvature.

2. The location of the clamp can be gauged by using a piece of 6 French tubing as a sizing indicator externally from the esophagus to the pylorus

3. Just below the gentle pressure line a two separate pieces of 7-0 suture will be run through the outer layer of stomach wall on both sides of the stomach

Surgical Closure

1. Perform an abdominal lavage with at least 25 ml of sterile saline using a gavage needle for at least 4 gavages (total 100 ml)

2. Change the gauze under the stomach before doing the lavage and with each successive lavage to prevent stomach contents on the gauze from entering the abdomen

3. Place the stomach back into the abdomen

4. Suction remaining saline using sterile cotton tip applicators and gauze

5. Instill Baytril (20 mg/kg) diluted in sterile saline into the abdominal cavity before closing

6. Close the linea alba abdominal wall with 6-0 PDS in a simple continuous pattern

7. Close the skin with 6-0 PDS in a simple continuous pattern

8. Use tissue glue over the suture line

Post-operative care

1. Animals will be provided with slurry diet for 3 days post-operatively consisting of the powdered original diet or test diet indicated for the animals study combined with water (1:1 ratio). The slurry will be replaced daily.

2. Each animal will be observed once to twice daily for the first three days and then daily thereafter for 10 days (total of 14 of monitoring)

3. Animals will be assessed for pain level, incision status, status of eating, fecal production, and hydration status.

4. For the first three days following surgery subcutaneous saline (1 ml) will be administered to all surgical animals.

5. Animals will be transitioned onto regular chow pellets of the designated diet as indicated by the study at Day 3 post-surgery. From this point forward all animals will being pair feeding between CSG and pair fed Sham controls until shipping or study indicates

6. Animal body weights will be collected prior to surgery on the day of surgery, at 3 days post-operative, at 10 days post-operative, and at 14 days post-operative right before shipping or placement onto study.

7. All post-operative observation records, body weight records, and pair feeding information will be sent along with any shipped animal cohorts