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Using the Lone Star Retraction System - Basic Principles and Techniques

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This guide has been developed using information taken from "Lone Star Retractor System™ Head and Neck Procedure Guide" by Mountain et al. (Department of Otolaryngology, University of Dundee, Scotland) and discusses the general principles of elasticated retraction and how these principles relate to the benefits experienced when using this system.

Tips are given on how best to deploy the stays to the operative field and how the elastic retraction forces they provide, can enhance surgical technique and the ergonomics of operating with them.

How to deploy stays

The techniques that were developed by Mountain et al are dynamic processes, of which elastic stays are as much a part of the procedure as they are a method of retraction. They advocate the deployment of the stays at an early stage in every operation, as soon as the subcutaneous layer is exposed. Traction and countertraction using a minimum of four, single-hooked stays applied to the opposing subcutaneous layers provides tension to the incision line. Further sharp dissection of the subcutaneous layer and then underlying muscle is aided by the elastic traction and countertraction forces created, allowing the wound to open spontaneously, in a circumferential manner, without the need of a surgical assistant.

Once the stays are in position and elastic tension has been applied, they can be easily manipulated to different tissue layers in a sequential manner. Skin flaps are then held back with the stays. The retraction of deeper fascial layers and muscle then evolves as the procedure is performed, with sequential application of the same retractor hooks to these deeper tissues. As a consequence of the attachment of four to six stays to deeper fascial planes and muscle, the surgeon creates a wide, yet shallow, surgical field. Deeper tissues are elevated into the surgical field. In placing the stays deeper in the tissue, the retraction provided not only expands the wound opening, but also serves to pull deeper structures up into the operative field, creating a wide, shallow wound rather than a deep and narrow wound.

In summary, once the skin is incised, early application of the stays is advised. Thereafter, the stays are moved deeper into the wound in a process that is continued until the desired level in the operative field is reached and adequate exposure achieved. In order to gain access to certain areas of the operative field, traditional metal retractors may be required during intermediate stages of some procedures. In this situation, the elasticated stays provide a stable baseline field of retraction, allowing for the assistant to use one or two handheld retractors to generate enough blunt force to gain access to specific areas of surgical dissection.

The lateral and horizontal angles of stay retraction can be adjusted throughout any operation depending on the need for surgical access. The sequences in which to deploy stays for individual procedures and the specific steps at which they are of particular use will vary on a procedural basis. The stays can be used in skin retraction, fascial retraction, muscle retraction, retraction of neoplasm, and linear skin wound closure.

Retraction

As with traditional retraction, elastic stays can create lateral traction and counter-retraction to expose a surgical field when forces are applied in opposite directions. The number of points at which the stays are applied will vary depending on the surgical exposure required. Because many stays can be placed around the surgical incision, retraction can be provided in different directions, thereby creating an appropriate shape to the exposed surgical field. Multidirectional retraction has proved useful when operating to expose and avoid injury to nerves and blood vessels in the site. The precision with which each stay can be placed in soft tissue, and the precision of elasticated retraction force applied to

them, is of significant benefit when creating a stable operative field with minimum field movement during surgery.

This precision of attachment is rarely achieved using traditional assistant-based, handheld retractors. Likewise, there is usually less precision of retraction force applied and more movement of tissues generated by an assistant using handheld retractors.

There are two main techniques used to provide attachment and fixation of elasticated stays:

1. *Attachment of stays to the Lone Star Retractor Systems.*
2. *Attachment of stays to surgical drapes*.

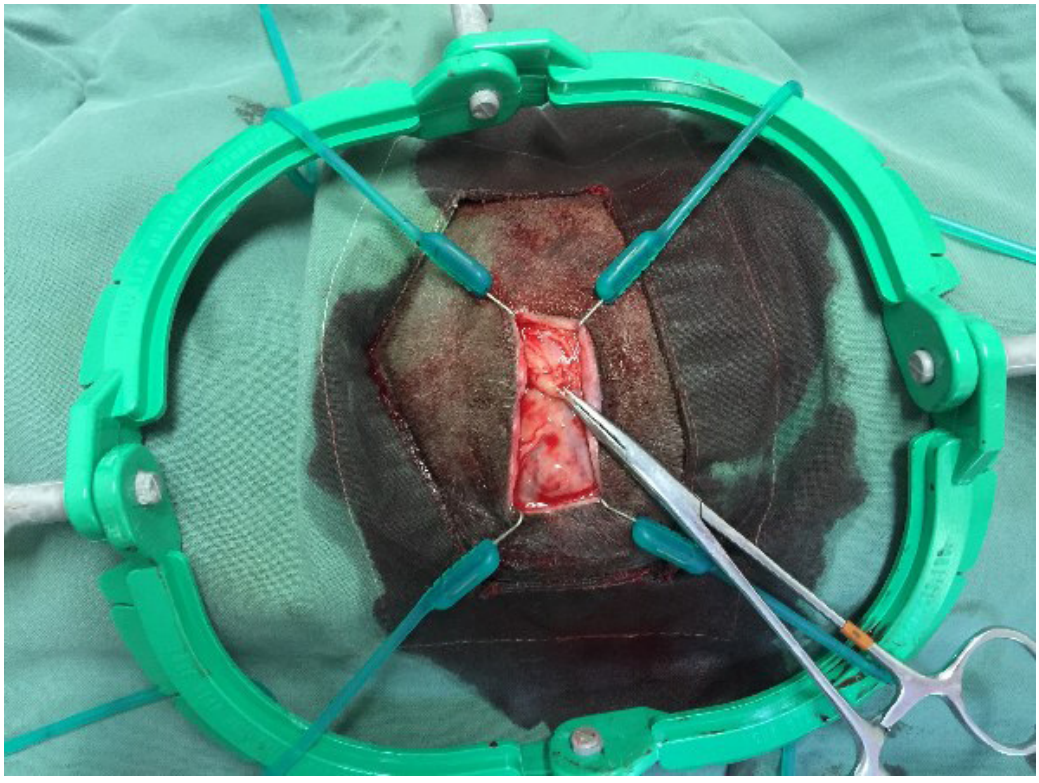
Both techniques use a similar principle of opposing attachment points to provide traction and counter traction forces to tissues within the operating field. They also both allow for multiple, circumferential attachment points that can be moved during different stages of the operation.

In this guide, we'll describe our practical experience using these two methods of attachment in head and neck surgery.

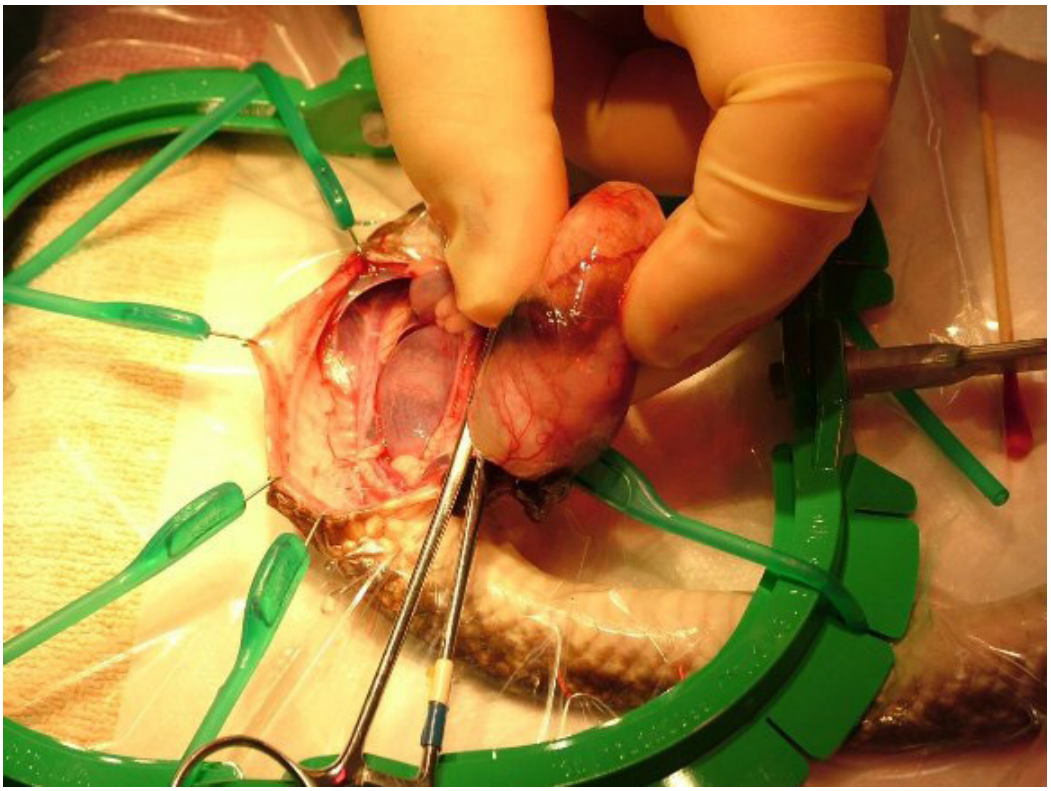
Attaching to the Lone Star Retractor Systems

The retractor ring systems come in a variety of shapes and sizes and can be increased/decreased in size and changed in angle to fit the surgical site. Depending on the scale and site of the procedure, an appropriate Lone Star Retractor System is generally available to meet the needs of the surgeon.

Retractor rings like the elastic stays can be reusable after sterilisation by autoclave or by other appropriate methods. It is recommended that the retractor rings are wrapped in drape material prior to autoclaving. Likewise the surgical stays can remain functional after a large number of autoclave sterilisation cycles if they are wrapped in drape material folded numerous times so that each stay is not in contact with another stay. ***Note that all Lone Star Retraction System products have a 1-year warranty and are validated through 20 autoclave cycles.***



Use of the Lone Star Retraction System during exploratory surgery of a suspected neoplasm in a guinea pig
Courtesy of Dr. Brendan Carmel, University of Melbourne, Australia



Use of the Lone Star Retraction System during a nephrectomy in a python
Courtesy of Dr Bob Doneley, University of Queensland, Australia

Positive attributes of these retractor systems include:

1. A rigidity that does not allow for movement once fixed in place
2. A wide variety of well-spaced attachment points in a circumferential design
3. Excellent fixation points, from which it is easy to attach and release stays
4. The ability to perform many procedures unassisted but with excellent surgical exposure

Difficulties found with these retractor systems include:

1. Difficulty “contouring” the frames to the patient’s body shape.
2. Attachment points sometimes being too high or too low.
3. Frames may “lift” from the patient and need to be fixed to the operative surface.

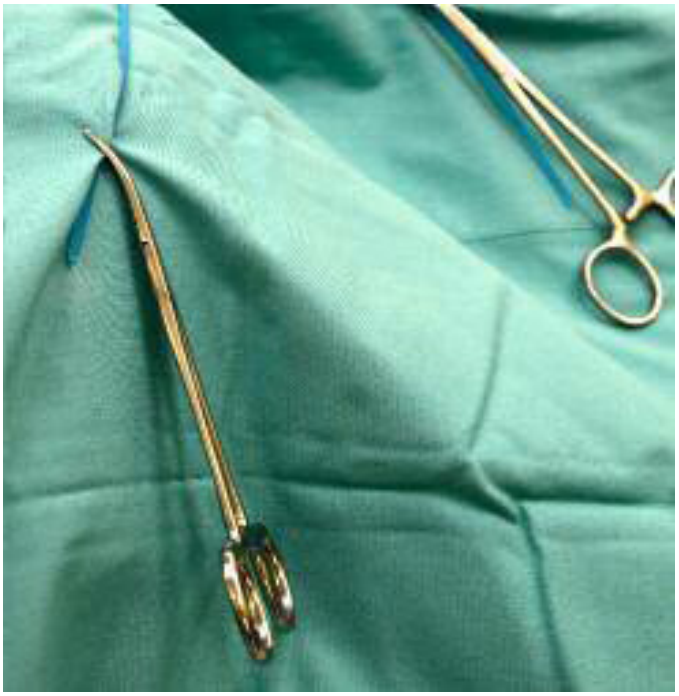
Fixation to surgical drapes

This technique is based on the surgeon finding appropriate attachment points on the surgical drapes. Surgical mosquito forceps are used to clip the elasticated stay to folds created in the surgical drape, as shown below.

Retraction using Lone Star Retraction System surgical stays attached to surgical drapes during human neck surgery

Photograph courtesy of Mr. Rodney Mountain, University of Dundee, Scotland

In larger patients, to provide adequate traction and counter-traction, the surgical mosquito forceps can be "hung by gravity" from the attachment point, as shown below



"Gravity Retraction" using Lone Star Retraction System surgical stays attached to surgical drapes
Photograph courtesy of Mr. Rodney Mountain, University of Dundee, Scotland.

Positive attributes of this technique include:

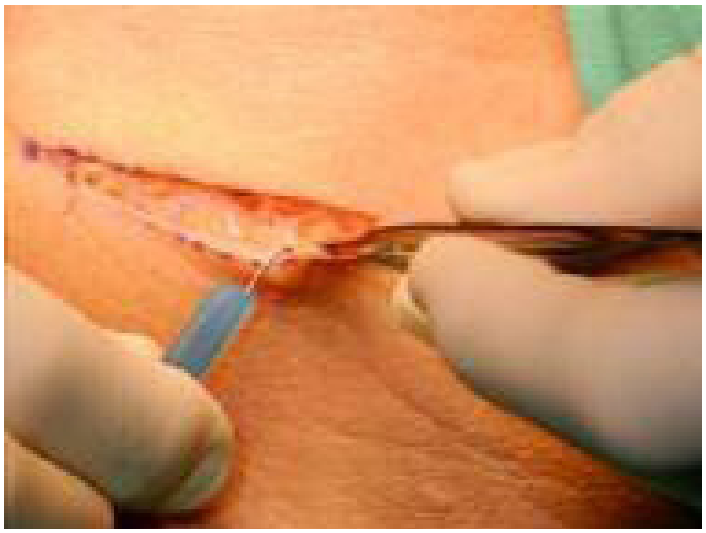
1. Numerous options of attachment in a wide variety of directions
2. The ability to apply fixation closer to the surgical site
3. A wide variety of angles of retraction can be achieved
4. The ability to perform many procedures unassisted but with excellent surgical exposure.

Difficulties found with this technique include:

1. Movement of the drapes may result in an alteration of retraction forces
2. The system is less rigid than the Lone Star Retractor Systems
3. There is a risk of trauma to underlying skin when the mosquito forceps and stay are attached.

Basic Skin Incision

After the initial skin incision is made, the sharp hook is placed subcutaneously. The stay is then stretched and applied to a point of fixation…….

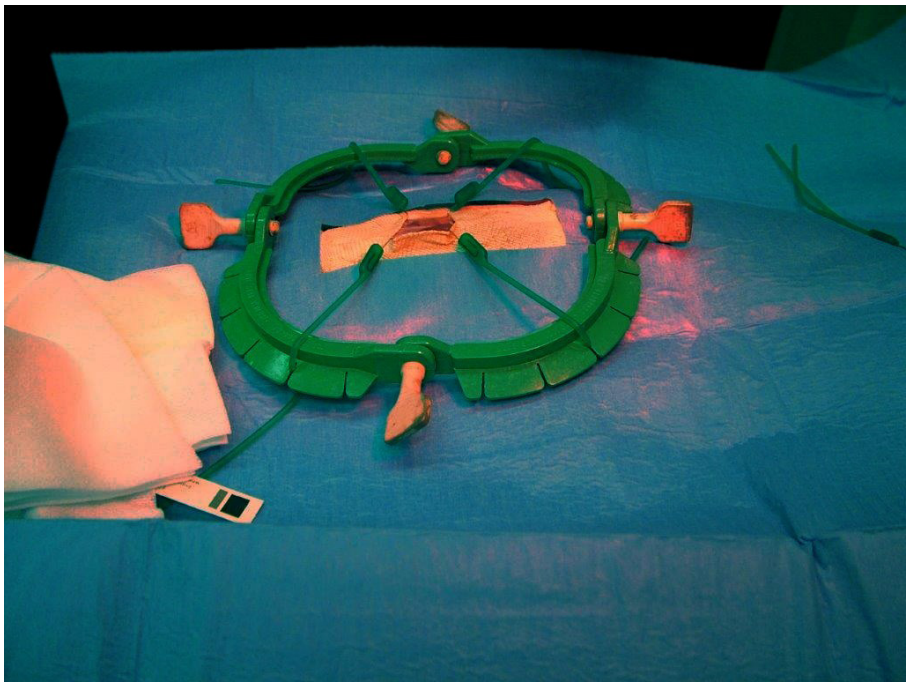


Initial incision prior to Flank Ovariohysterectomy in a Guinea Pig using Lone Star Retraction
Photograph courtesy of Dr Narelle Walter, Melbourne Rabbit Clinic

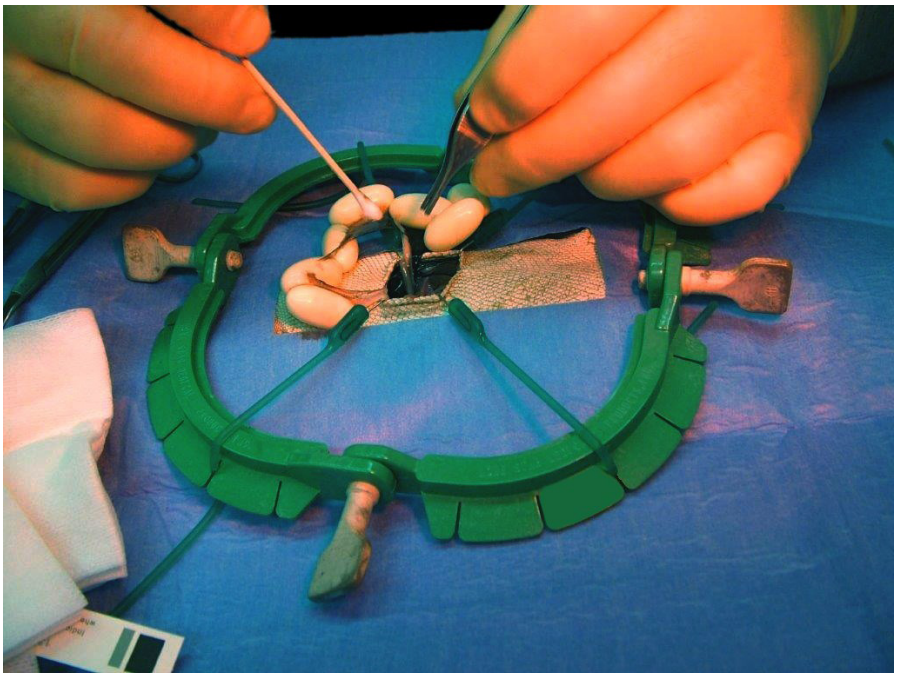
Two stays are placed inferiorly and then two placed superiorly to provide for traction, counter-traction, and elevation……

Flank Ovariohysterectomy in a Guinea Pig using Lone Star Retraction
Photograph courtesy of Dr Narelle Walter, Melbourne Rabbit Clinic

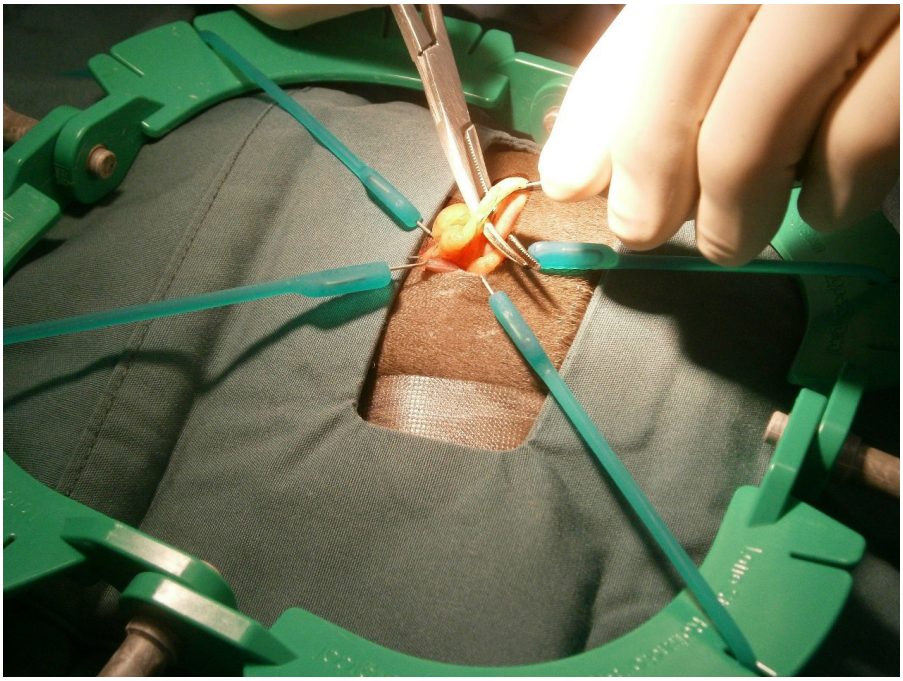
The subcutaneous tissue is now under tension and can be divided with sharp or blunt dissection, providing for a stable surgical field that slowly enlarges circumferentially without the use of a surgical assistant…….



Early stages of ovariohysterectomy in a Bearded Dragon using Lone Star Retraction
Photograph courtesy of Dr Bob Doneley, University of Queensland, Australia



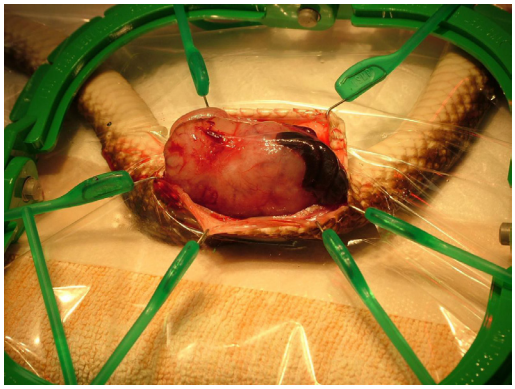
Ovariohysterectomy in a Bearded Dragon using Lone Star Retraction
Photograph courtesy of Dr Bob Doneley, University of Queensland, Australia



Flank Ovariohysterectomy in a Guinea Pig using Lone Star Retraction
Photograph courtesy of Dr Narelle Walter, Melbourne Rabbit Clinic

Skin Incision Closure

When closing any linear incision, two stays can be placed in the lateral corners of the wound, allowing the skin edges to appose for ease of closure.



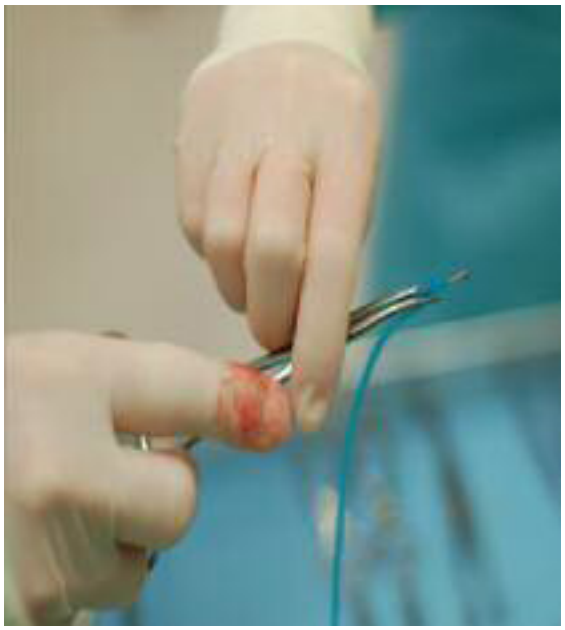
Photographs courtesy of Mr. Rodney Mountain, University of Dundee, Scotland

Safety Tips for the use of the Lone Star Retraction System

Handling stays

If surgical assistance is being used, passing the stay from assistant to surgeon is the starting point in using these stays. If necessary, the assistant can "load" the number of stays that will be required for the specific procedure into mosquito forceps prior to starting the operation or, alternatively the stays can be "loaded" as required. During minor operations, the minimum use of four stays is recommended. For more major operations, six to eight stays may be required. For safety purposes, it is advised that the stays are handled attached to a mosquito forceps. This allows the stay to be handled safely without having to hold the elastic or hook components of the stay. Having the stay gripped by the mosquito forceps also facilitates the initial hook placement to the tissue in a controlled manner.

In removing stays from soft tissue, we advocate first removing any tension from the stay by releasing the tail end from the point at which it is attached. In doing so, control of the hook can be gained after any elastic tension has been removed. Once under control, the hook can be "loaded" back onto a mosquito forceps for transfer back to the assistant or the instrument trolley.

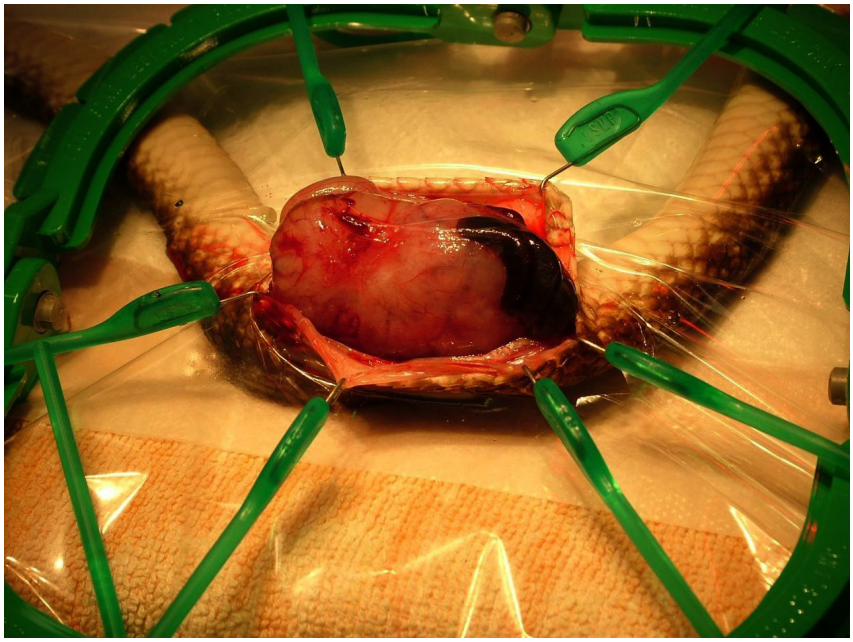


Recommended procedure for surgeon handing a stay back to the assistant

Courtesy of Mr. Rodney Mountain, University of Dundee, Scotland.

Positioning in soft tissue

`Part of the learning curve involved when first using this system includes knowing how to place the hook in sufficient soft tissue to prevent tissue damage. The curvature of the sharp hook attachment point allows for deep hook placement and blunt retraction of tissues within its curvature. In placing a hook in enough soft tissue, excessive point force to tissue is avoided. Although the hooks are sharp, if precisely placed in subcutaneous fat, fascia, or muscle, little tissue damage should occur.



Precise placement and tension of Lone Star Retraction System surgical stays during a nephrectomy in a python

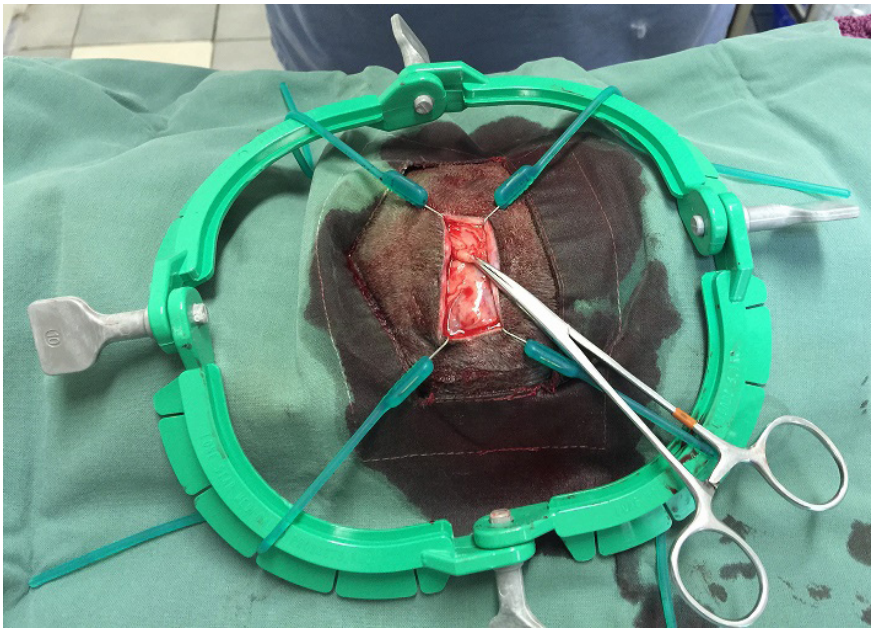
Courtesy of Dr Bob Doneley, University of Queensland, Australia

Sharp-ended stay attachment to blood vessels and nerves should be avoided.

Great care should also be taken if using blunt stays to retract blood vessels. The use of stays to retract nerves is not recommended.

Oncological procedures

In oncological procedures, caution must be taken to avoid placing the hooks directly into tumor substance. The theoretical risk of seeding cancerous cells into soft tissue is one that must be taken into account in any procedure in which this system of retraction is used.



Use of Lone Star Retraction System during an exploratory surgery of a suspected tumour in a guinea pig

Photograph courtesy of Dr. Brendan Carmel, University of Melbourne, Australia

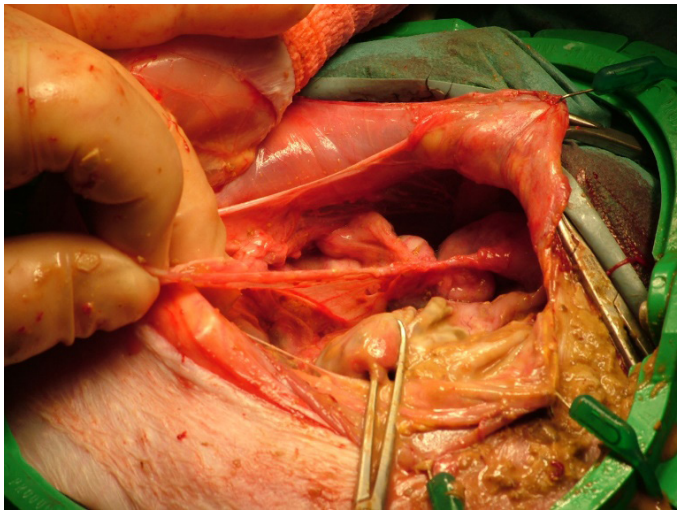
Veterinary Notes

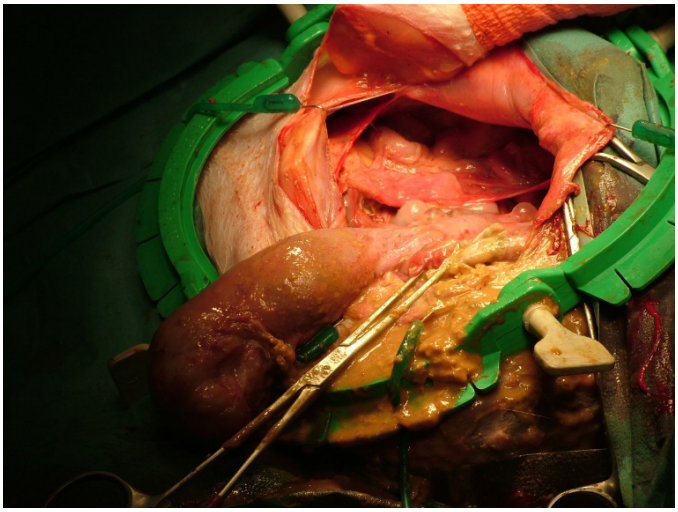
The Lone Star Veterinary Retractor System consists of two autoclavable components, the retractor ring and surgical stays or hooks. The retractor ring can easily be adapted to the anatomy of most surgical sites. As demonstrated above, the surgical stays provide precise retraction with adjustable tension, without obstructing the surgical site.

Applicable veterinary procedures Include:

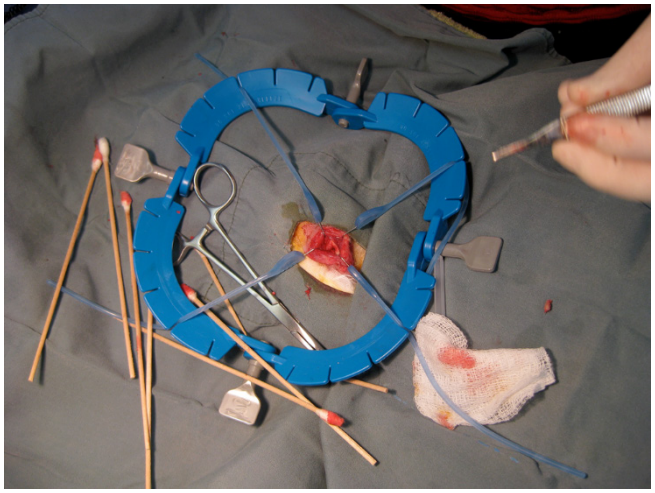
- **Cataract Removal**
- **Inguinal, Perineal or Umbilical Hernia Repair (canine)**
- **Laminectomy (canine)**
- **Anal Sac Removal (canine)**
- **Neoplasm excision (any species)**
- **Microsurgery in avian, reptile, rodent, exotic mammal, fish and amphibian patients**

such as.....





Use of Lone Star Retraction System during an egg yolk peritonitis surgery in a domestic fowl
Courtesy of Dr Bob Doneley, University of Queensland, Australia



Dental Abscess Surgery in a Rabbit using Lone Star Retraction
Photograph courtesy of Dr Narelle Walter, Melbourne Rabbit Clinic

All Lone Star Veterinary Retractor System products have a 1-year warranty and are validated through 20 autoclave cycles.

Ordering Information:

Product Number	Description	
4405	Retractor ring (25 cm x 14.2 cm) with 6 thumb screw releases for articulation. Packaged singly (non-sterile).	
4407	Retractor ring (14.2 cm x 14.2 cm) with 4 thumb screw releases for articulation. Packaged singly (non-sterile).	
4412-6	Retractor hooks/surgical stays (15.7 cm length, radius 5 mm and tail O.D. 3.3 mm). Packaged singly (non-sterile).	

Available only from:

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