

# Lone Star

RETRACTOR SYSTEM™

## Head and Neck Procedure Guide



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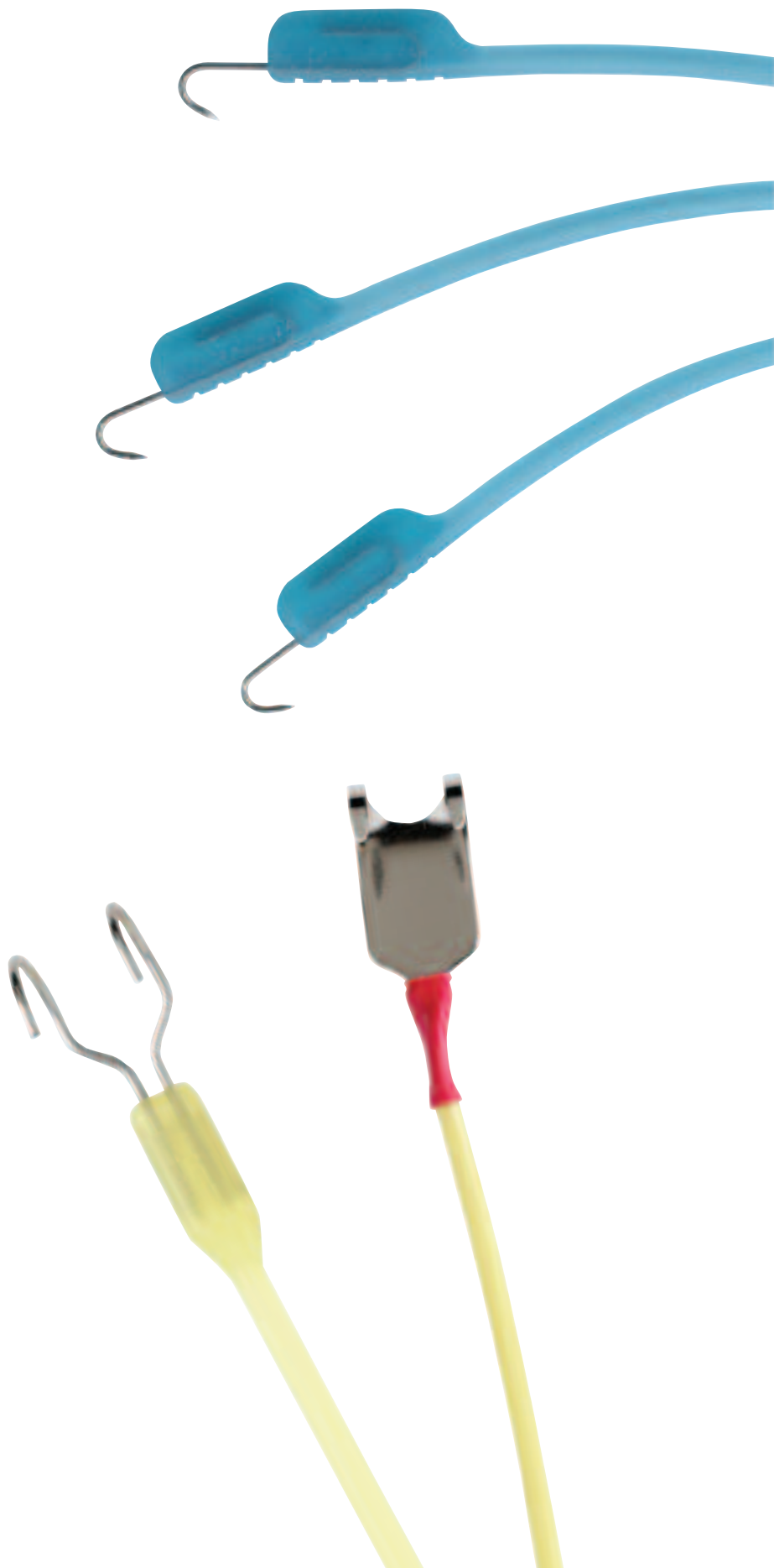
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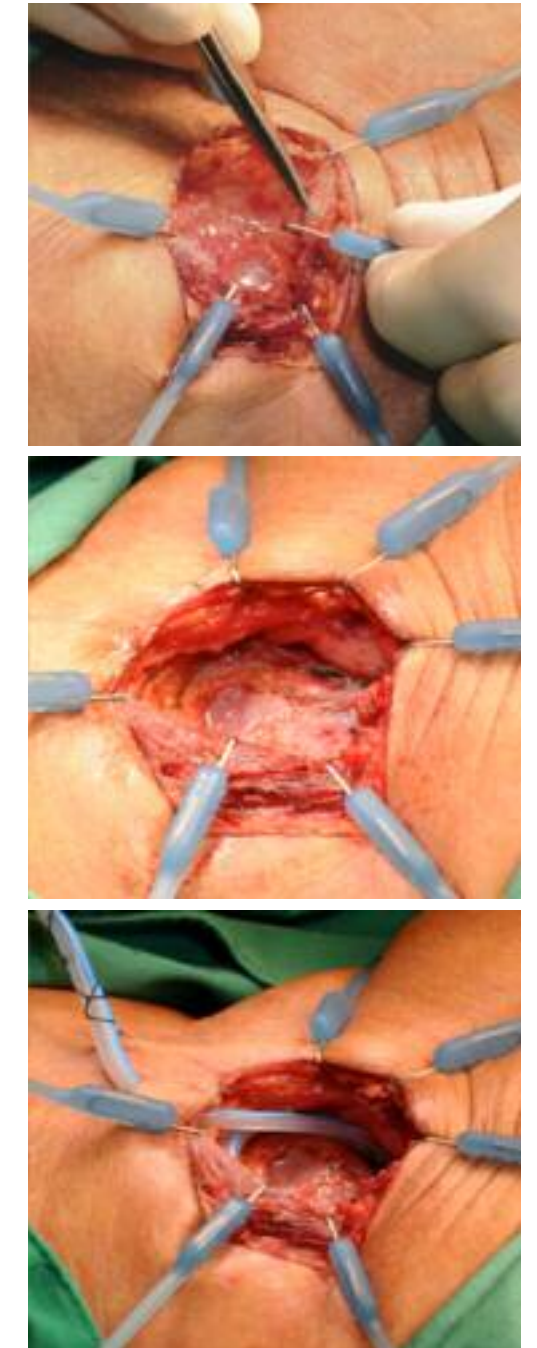
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## Introduction

As a surgical team that specializes in head and neck procedures, we have found CooperSurgical (Lone Star) elasticated stays to be of great benefit to all of our operative surgical practice. The system of stays with their elastic retraction have enhanced surgical technique, creating a much safer operative field. In this procedural guide, we share our experiences of using elasticated tissue retraction in a wide range of head and neck procedures.

These experiences include the technical benefits we have found using this system and how it effected or improved the specific surgical sequences used when deployed during various procedures. We also describe the physics behind elasticated retraction and contrast it with other techniques that are currently available, assistant-held metal retractor instruments used to gain access during head and neck operations.

As elasticated retraction enhances the role of the surgical assistant and operating surgeon, we share the experiences of both trainers and trainees using the system in a teaching hospital environment.



Photographs courtesy of Mr. Rodney Mountain MBChB FRCS (ORL)Ed University of Dundee, Scotland

# Basic Principles

In this section, we will discuss the general principles of elasticated retraction and how these principles relate to the benefits experienced when using this system. We consider 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 we have developed are dynamic processes, of which elastic stays are as much a part of the procedure as they are a method of retraction. We advocate the deployment of the stays at an early stage in every neck operation, as soon as the sub-dermal fat layer is exposed. Traction and counter-traction using a minimum of four, single-hooked stays applied to the opposing subdermal layers provides tension to the incision line. Further sharp dissection of the subdermal layer and then platysma is aided by the elastic traction and counter-traction 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. If the platysma is well formed, this is the usual second stage of attachment deployment, allowing for lateral retraction, elevation, and eversion of the platysmal layer and ease of access to allow subplatysmal dissection and flap creation. 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 neck, 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, we advocate early application of the stays. Thereafter, they are moved deeper into

the wound in a process that is continued until the desired level in the neck is reached and adequate exposure achieved. In order to gain access to certain areas of the operative field, traditional metal retractors are often required during intermediate stages of any operation. 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.

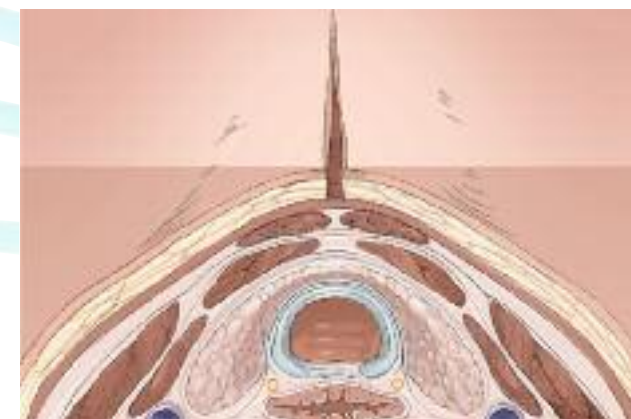
The lateral and horizontal angles of stay retraction can be adjusted throughout any operation depending on the need for surgical access. The sequences in which to deploy stays for individual procedures and the specific steps at which they are of particular use will be discussed later, on a procedural basis. We include suggestions on how to use stays in skin retraction, platysmal elevation, fascial retraction, muscle retraction, salivary gland retraction during facial nerve dissection, tumor retraction, and linear skin wound closure.

## Retraction

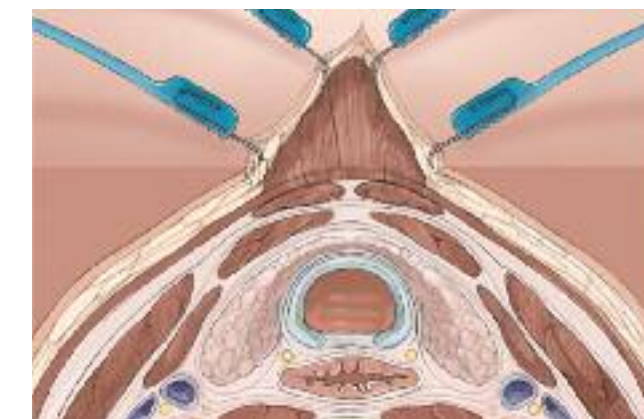
As with traditional retraction, elastic stays can create lateral traction and counter-retraction to expose a surgical field when forces are applied in opposite directions. The number of points at which the stays are applied will vary depending on the surgical exposure required. Because many stays can 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 neck. 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.

## Example of surgical access using four elasticated stays during a Tracheostomy



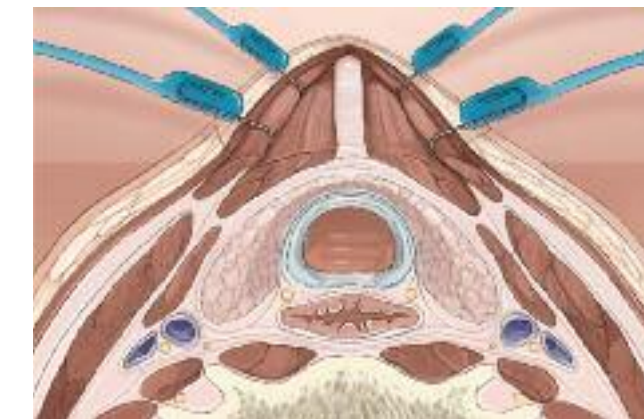
1. Skin incision with exposure of subdermal fat.



2. Placement of four stays into subdermal tissue, providing traction and counter-traction at an early stage.



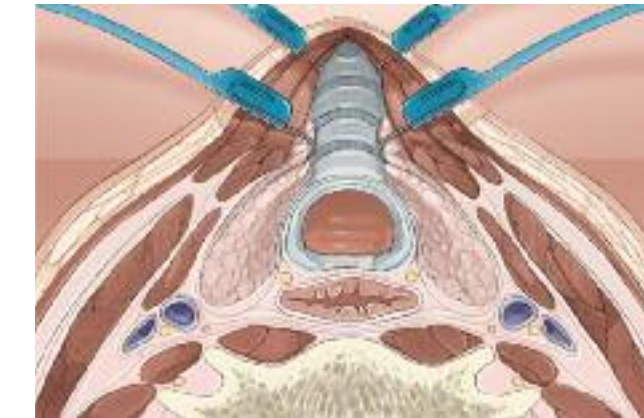
3. Platysmal layer is divided, followed by deeper placement of the four stays.



4. Sternohyoid muscle is separated and retracted laterally allowing for a wide field of exposure.



5. Sternothyroid muscles are separated and retracted, demonstrating the additional benefit of elevation and eversion of deep neck tissues.



6. Retraction of divided thyroid isthmus with exposure of the trachea.

**Note:** No angled, assistant-held metal retractors are required to gain surgical access to the trachea. A fifth stay may be used to allow for cricoid cartilage retraction.

# Basic Principles (Continued)

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 the Lone Star Retractor Systems

These systems come in a variety of shapes, sizes and forms. Depending on the scale and site of the head and neck operation, an appropriate Lone Star Retractor System is available to meet the needs of the surgeon. Retractor rings are available in both disposable and reusable models.

*Photo 1, opposite page:* This image shows a disposable retractor system being used during the removal of a thyroglossal duct cyst.

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

Difficulties found with these retractor systems include:

1. Difficulty "contouring" the frames to the patient's head, neck, and shoulders.
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

*Photo 2, opposite page:* 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 in this image.

*Photo 3, opposite page:* In order to provide adequate traction and counter-traction, the surgical mosquito forceps can be "hung by gravity" from the attachment point, as shown in this image.

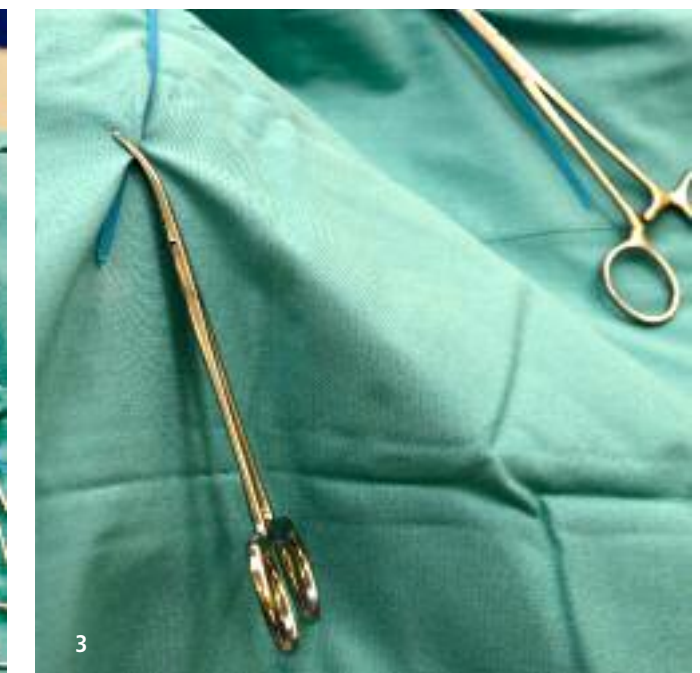
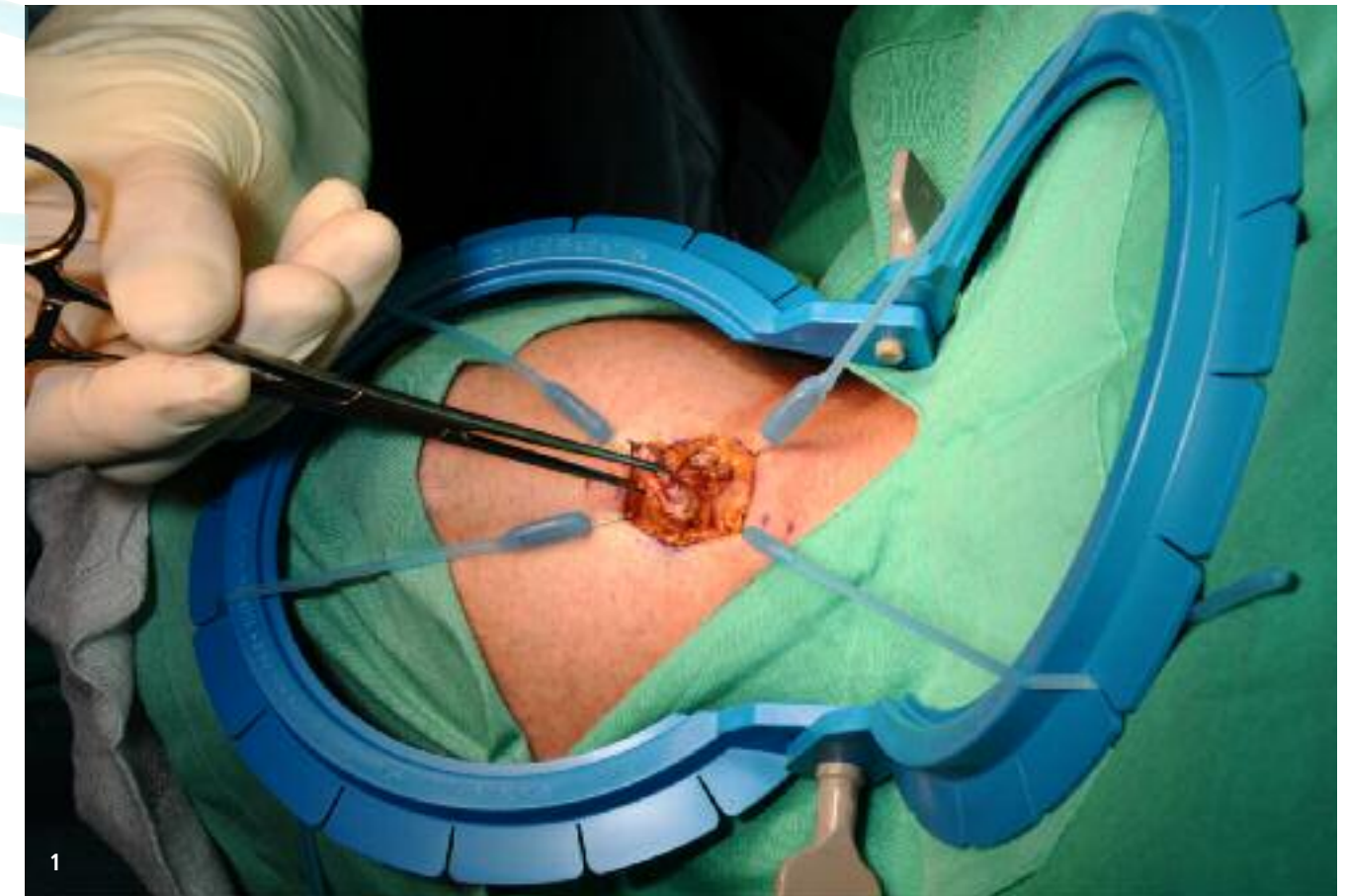
Positive attributes of this technique include:

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

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.

## Attachment of elasticated stays during head and neck operations



Photographs courtesy of Mr. Rodney Mountain MBChB FRCS (ORL)Ed University of Dundee, Scotland

## Safety

We describe a few techniques that enhance the safe use of the CooperSurgical Lone Star stays during head and neck operations.

### Handling stays

Passing the stay from scrub nurse to surgeon is the starting point in using these stays. Our scrub nurses “load” the number of stays that will be required for the specific procedure into mosquito forceps prior to starting the operation. During minor operations, we advocate the minimum use of four stays. For more major operations, six to eight stays may be required. Upon asking for a stay, the surgeon receives the stay attached to a mosquito forceps. This allows the stay to be passed safely without either party 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 neck 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 and handed back to the scrub nurse.

### 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, platysma, deep neck fascia, or muscle, little tissue damage should occur. 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. We would not advocate the use of stays to retract nerves.



Surgeon handing a stay back to the scrub team

Photographs courtesy of Mr. Rodney Mountain MBChB FRCS (ORL)Ed University of Dundee, Scotland

### 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.

*All CooperSurgical Lone Star stays are for single use only.*

## 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.



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



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.



Photographs courtesy of Mr. Rodney Mountain MBChB FRCS (ORL)Ed University of Dundee, Scotland

## Skin Incision Closure



When closing any linear head or neck 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 MBChB FRCS (ORL)Ed University of Dundee, Scotland

## Tracheostomy

Four-point retraction with sharp hook stays allows for circumferential skin and subcutaneous retraction, elevation, and eversion with exposure of the midline strap muscles. The four stay hooks are then placed at the medial aspect of the sternohyoid muscle. These muscles are separated to expose the sternothyroid muscles. The hooks are then attached to the medial aspect of these muscles to allow for exposure of the thyroid isthmus.



The thyroid isthmus is then divided. Stays can then be placed into the divided thyroid tissue to allow for clear exposure of the pre-tracheal fascia and underlying trachea. Superior elevation of the cricoid can be achieved with use of an additional sharp retractor placed under the cricoid cartilage.



Stays are removed when the tracheostomy tube is inserted and a safe airway has been established.



Photographs courtesy of Mr. Rodney Mountain MBChB FRCS (ORL)Ed University of Dundee, Scotland

## Lymph Node Biopsy



For skin division and exposure of subcutaneous fat, place the four stays into the subcutaneous fat layer. The platysma is then divided and the stays attached to the subplatysmal plane. Once the operative field becomes deeper and narrower, place the stays into the deeper fascial layers. This will bring the lymph node closer to the surface, along with its soft tissue attachments.



In raising deeper tissues up to a shallower operative field, the lymph node is more easily accessible. This allows for safe dissection around the lymph node, detaching its soft tissue attachments.



Once the lymph node has been excised the stays can be repositioned in the skin. This creates a cavity that can be inspected for any bleeding, irrigated, and, if necessary, a drain placed.

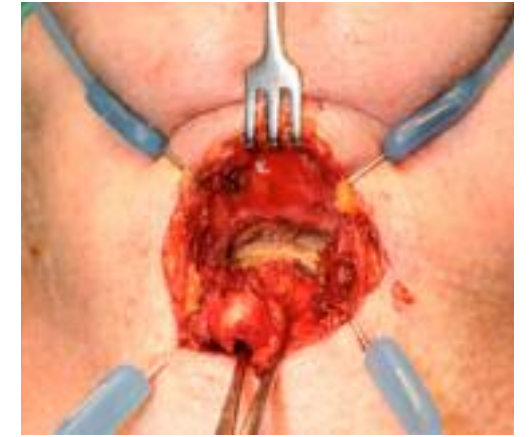
Photographs courtesy of Mr. Rodney Mountain MBChB FRCS (ORL)Ed  
University of Dundee, Scotland

## Excision of Thyroglossal Duct Cyst

A horizontal incision through skin, platysma, and subplatysmal tissues is used to expose the midline strap muscles.



The cyst's association with the hyoid bone can be identified and access to the hyoid bone and tongue base tissues enhanced by the use of a superiorly placed hooked metal retractor or additional elasticated stays. Thyroglossal duct cyst exposure is achieved with circumferential dissection and exposure of the middle third of the hyoid bone. The cyst can be retracted with metal instruments, providing traction and counter-traction.



This is a lateral view of the surgical exposure achieved with elasticated stay retraction.



Photographs courtesy of Mr. Rodney Mountain MBChB FRCS (ORL)Ed  
University of Dundee, Scotland

# Parotidectomy



Anterior and posterior skin retraction is maintained in position utilising four or five stays. The ear lobule is retracted by means of a single stay. Division of the deep cervical fascia along the anterior border of the upper sternocleidomastoid muscle with release of parotid fascia from the mastoid region allows for anterior retraction of the parotid gland.



Elasticated retraction of the anterior border of the sternocleidomastoid allows for controlled access and exposure of the posterior belly of digastric muscle.



Once the facial nerve trunk is identified at the upper border of the posterior belly of the digastric muscle, further controlled retraction and division of parotid gland tissue can be aided by two elasticated retractors. This allows progressive exposure of the facial nerve with sharp dissection or bipolar diathermy techniques.

Photographs courtesy of Mr. Rodney Mountain MBChB FRCS (ORL)Ed  
University of Dundee, Scotland

This is a close-up view of the elastic stays placed into surrounding parotid tissue to assist the controlled separation of glandular tissue, creating evolving access to the facial nerve along its trunk and branches.



Once the branching pattern of the facial nerve is identified, an anterior skin flap is developed using retraction of skin edges with elasticated hooks. The surgical assistant can elevate a number of retractors to avoid a "button-hole" skin penetration.



The five stays can be moved constantly to provide optimal retraction of either skin or parotid tissue to allow for the safe removal of parotid tumors.



Photographs courtesy of Mr. Rodney Mountain MBChB FRCS (ORL)Ed  
University of Dundee, Scotland



## Thyroidectomy and Parathyroidectomy



After the initial incision is made, the stays are placed to provide skin retraction and exposure to the strap muscles. Once separated in the midline, the strap muscles can be retracted in order to dissect the thyroid gland away from surrounding tissues.



In order to access the superior and inferior poles, traditional blunt metal retraction can be used in addition to the elastic stays. Four stays provide excellent background retraction, assisting the traction and counter-traction forces required to remove thyroid or parathyroid tissue.



At the end of the resection, the wound is irrigated, hemostasis achieved, and a drain inserted.

Photographs courtesy of Mr. Rodney Mountain MBChB FRCS (ORL)Ed  
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## Access to the Lateral Neck

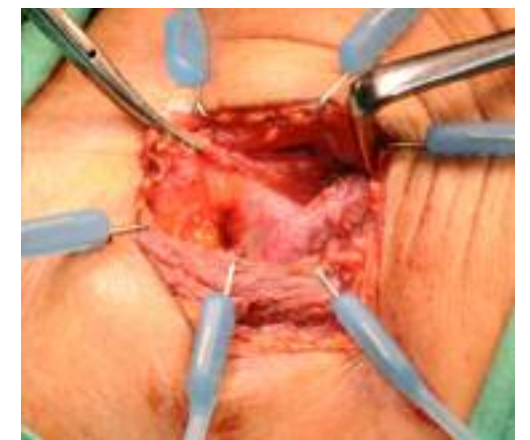
A horizontal, slightly curved skin incision is deepened to expose subcutaneous fat. Four hooked elastic stays are placed in the subcutaneous tissue plane. The platysmal muscle layer is then divided and four to six stays placed to help in the elevation of a circumferential subplatysmal tissue plane. During this dissection, care is taken to identify and preserve the greater auricular sensory nerve, often encountered in a subcutaneous plane.



The anterior border of sternocleidomastoid muscle is defined and a fascial tissue plane created along the exposed anterior length of the muscle. Three elasticated hook stays are then repositioned along the anterior border of sternocleidomastoid to provide exposure of the carotid sheath. Three hooks are placed in anterior and superior submandibular fascia to provide for counter-traction to the three hooks placed posteriorly and inferiorly into the anterior edge of the sternocleidomastoid muscle.



Six hooked elastic stays provide for optimum wide exposure and surgical field elevation. The circumferential surgical exposure provided by the elasticated stays frees the surgical assistant to provide the additional two planes of retraction often necessary to gain safe access to parts of the lateral neck space.



Photographs courtesy of Mr. Rodney Mountain MBChB FRCS (ORL)Ed  
University of Dundee, Scotland

## Access to the Lateral Neck (Continued)



As with other procedures, placing the stays back on the skin and superficial tissues creates a cavity that can be inspected for bleeding. This stable cavity also can be used to locate a safe place to pass the drain trochar.



Insertion of a surgical drain is then carried out.

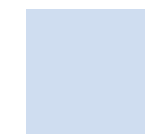
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## Summary

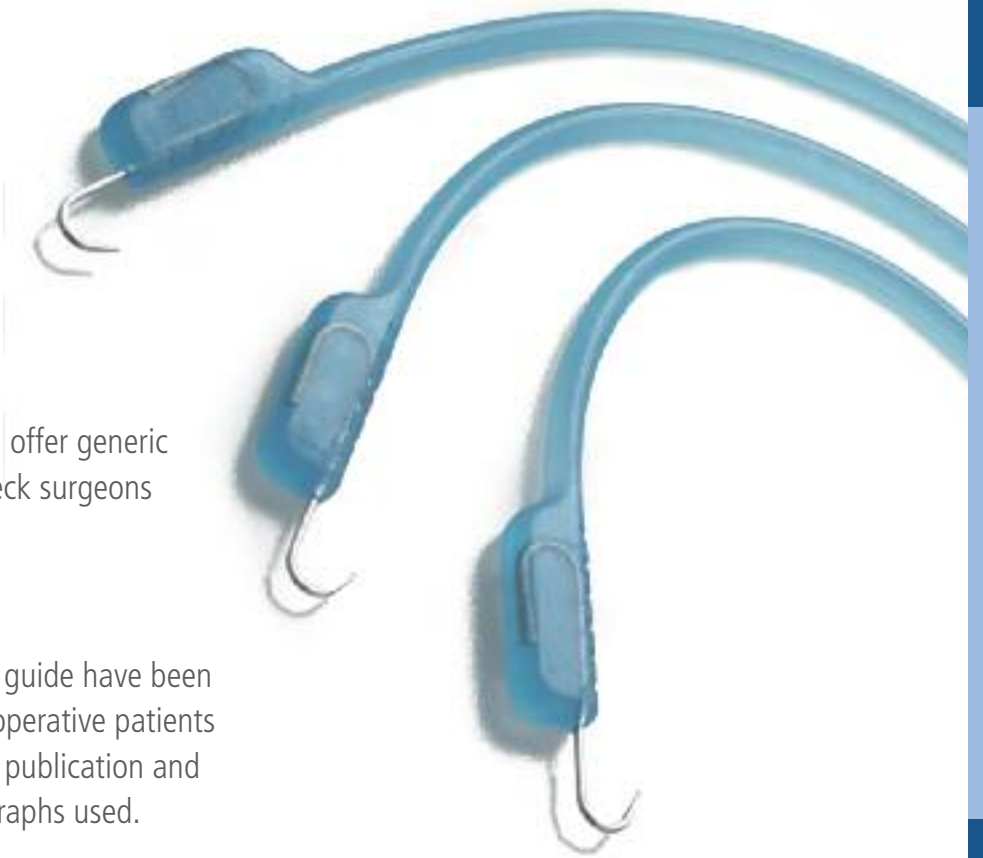
The six operations described herein offer generic guidance to operating head and neck surgeons and their assistants.

### Photography:

All of the photographs used in this guide have been taken during actual surgeries. The operative patients have all given their full consent for publication and cannot be identified by the photographs used.



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RETRACTOR SYSTEM™

## Head and Neck Procedure Guide



CooperSurgical is the leading company dedicated to providing medical devices and procedure solutions that improve health care delivery to women, regardless of clinical setting. Our company is fostering that position through expansion of its core businesses and introduction of advanced technology-based products that aid clinicians in the management and treatment of commonly seen conditions.

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