

# Application and use of subcutaneous stay sutures in anterior cervical spine surgeries with a transverse neck incision: A technical report

## ABSTRACT

**Objective/Purpose:** The objective of this study is to describe our experience with the use of stay sutures and transverse neck incision for anterior cervical spine surgeries involving multiple levels.

**Summary of Background Data:** Transverse incisions on neck usually heal with minimal fibrosis resulting in cosmetically acceptable scars whereas vertical incision, although provides greater exposure, heals with extensive fibrosis resulting in ugly scars. Transverse incision is thus highly recommended. However, the fear of nonextensibility of transverse incision for multilevel fusion has led to the preference of vertical incision, development of techniques for identifying the optimal level of the incision, or has suggested the usage of two transverse incisions.

**Materials and Methods:** Seventy-six patients underwent anterior cervical spine surgeries using a transverse neck incision for single or multilevel discectomy/corpectomy and fusion. Having divided the platysma, dissection was carried down to the anterior surface of the cervical spine between the carotid sheath laterally and the trachea and esophagus medially. Stay sutures were taken through the platysma and subcutaneous tissue, converting the transverse incision into a quadrilateral window providing access for as much as three-level corpectomy or five levels of fixation.

**Results:** All the wounds healed with no evidence of wound-related complications, leaving a cosmetically acceptable scar.

**Conclusion:** Using appropriately placed stay sutures, a transverse neck incision taken in the middle of the field of work can provide enough of a surgical window to perform multilevel fusion surgeries. Its simplicity and cost-effectiveness make it easily implementable, addressing the underlying pathology adequately with best possible cosmetic results.

**Keywords:** Anterior cervical approach, cervical spine, cosmesis, neck incision, stay sutures

## INTRODUCTION

Anterior cervical approach is typically the most common surgical procedure for many cervical spine pathologies. This approach allows clear visualization and direct access to the cervical vertebrae and the intervertebral discs, which are usually involved in causing the stenosis, spinal cord or nerve compression and provides access to almost the whole of the cervical spine, from the C2 segment to the cervicothoracic junction. Cloward<sup>[1]</sup> and Smith and Robinson<sup>[2]</sup> devised operative techniques for anterior cervical approach, following which various modifications have been used by numerous surgeons since 1958.<sup>[3]</sup>

There is growing enthusiasm for the use of smaller incisions in head-and-neck region with better cosmetic outcome while achieving the optimum and safe exposure of area of interest.<sup>[4]</sup> With respect to wound healing, it is a

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well-recognized principle that vertical skin incisions in the neck tend to heal with excessive fibrosis and contracture, and the resulting scars frequently stand out prominently as unsightly cicatricial cords. It is likewise well known that slightly oblique or transverse incisions usually heal with minimal scarring. The scars following neck dissection make an appreciable difference in the subsequent appearance of the patient.<sup>[5]</sup> Thus, although a transverse incision gives a cosmetic better scar, sometimes, a vertical incision medial to sternocleidomastoid is used when a larger exposure is warranted.<sup>[6]</sup>

Utter<sup>[7]</sup> stated that the placement of stay sutures at either end of a transverse skin incision can facilitate exposure and obviate the need for a retractor placed superior to inferior. The use of stay sutures technique has been described for tracheostomy, ocular surgeries, abdominal surgeries, and various others. However, after an extensive search of English language literature, we did not find any similar studies suggesting the technique and use of stay sutures in anterior cervical spine surgeries.

The aim of this article is to describe our experience with transverse cervical skin incision and use of stay sutures in anterior cervical spine surgeries, describing its method of placement thus helping the fellow spine surgeons in gaining adequate multilevel access to the cervical spine with a resulting fine scar carefully hidden in the skin creases giving best possible cosmetic result.

We thus propose a stay suture technique for anterior cervical exposure whereby, once exposure is completed, a transverse incision is converted into a longitudinal exposure allowing even up to three-level corpectomy and fixation.

## MATERIALS AND METHODS

Using the technique of stay sutures, 76 patients underwent anterior spinal surgeries including single-level discectomy (21), single-level corpectomy or three-level fixation (32), two-level discectomy (3), two level corpectomy or four level fixation (17), and three level corpectomy or five level fixation (03). The level of pathological vertebrae ranged from C3 to C7 involving fixation from C2 to T1 level. Written informed consent for surgery was taken from all the patients.

Each patient was induced in the supine position with the head in slight extension. With the preparation of the surgical site and draping, adhesive plastic drapes impregnated with antimicrobial agents are applied on the skin over operative area and the surrounding drapes. It is important that the

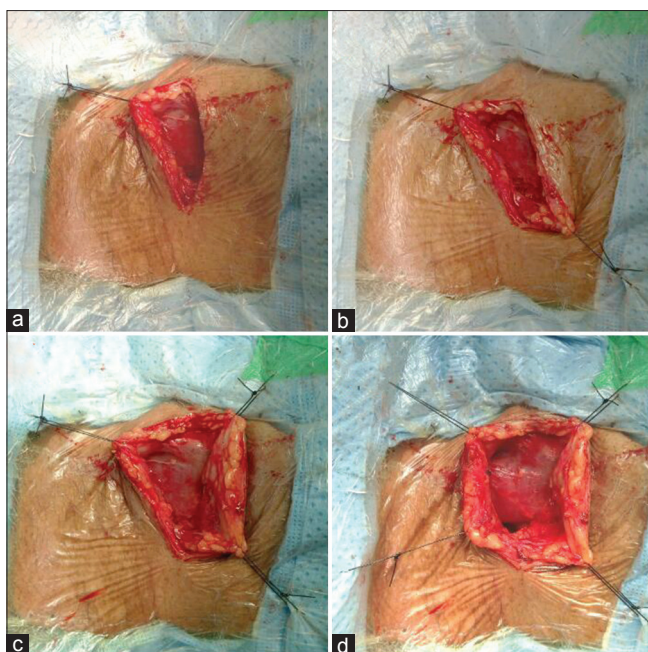
adhesive plastic drapes cover the surrounding drapes adequately as it enhances the adhesion between surgical drapes and the prepared skin in addition to limiting the spread of microorganisms onto the surgical field and maintains the drapes in place as the stay sutures are tied to it.

A transverse skin crease incision was made on the left side of the neck starting just beyond the midline up to the middle of sternocleidomastoid muscle [Figure 1]. The level of incision was roughly decided with the help of preoperative lateral cervical X-rays taking thyroid cartilage as a reference. Saline-based diluted adrenaline in 1:300,000 concentration or plain saline was then infiltrated into the subcutaneous plane for ease of achieving separation of tissue planes making the dissection less traumatic along with the vasoconstrictor effect in the subcutaneous tissue. Platysma muscle was then divided horizontally, and the dissection was carried down along the anatomic planes, following standard surgical procedure, to reach the anterior surface of the cervical spine between the carotid sheath laterally and the trachea and esophagus medially. Neurovascular structures encountered in the way, around a particular cervical level, were identified, traced, and secured.

Having reached the cervical spine, nonabsorbable silk sutures were passed through the subcutaneous layer of the skin along with the transversely cut platysma at an approximate distance of one-fourth of the length of incision from either corner and tied to the nearby, minimally movable drape under moderate tension. Similar suture was taken on the diagonally opposite side of the incision followed by the remaining two corners in a similar way to create a quadrilateral window as shown in Figure 2. Sutures taken too close to the corners of incision resulted in a more horizontal (mediolateral) rectangular window while those taken closer to the middle of incision, resulted in a more vertical (superior-inferior) one, as illustrated in [Figure 3]. The sites of sutures can thus be adjusted according the levels needed to be operated on. A more vertical window would be preferable for surgeries



Figure 1: Transverse neck incision



**Figure 2: Sequence of taking stay sutures. (a) Placement of first suture at any of the four corners. (b) Placement of second suture diagonally opposite to the first. (c) Placement of third suture at either of the remaining corners. (d) Placement of last suture diagonally opposite to the third**

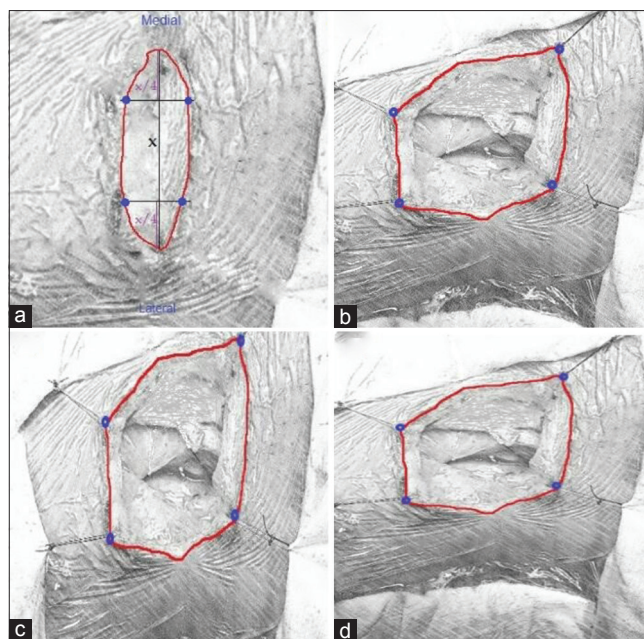
involving multiple levels. The surgical field of exposure can thus be converted into a movable window that can be adjusted according to the number of levels to be operated on.

A right-angled retractor then placed on the medial side to retract the trachea and esophagus gave an excellent exposure substantially eliminating the force needed for lateral retraction. However, we preferred to place a broad right angled retractor on the lateral side with its base resting on the edge of vertebral body along the longus colli, with minimal retracting force, just to protect the structures within carotid sheath from direct trauma as shown in Figure 4. Medial retraction is set free at regular intervals of 20 min to prevent prolonged retraction of trachea and esophagus thus minimizing the associated complications such as ischemic necrosis of the esophageal wall.

Stay sutures were removed at the end of the procedure after a thorough wash was given in the surgical wound. The platysma muscle was sutured back, and the skin incision was closed with subcuticular sutures. Skin sutures were removed at the end of 1 week, and all patients were observed carefully for any wound-related complications as it healed.

## RESULTS

All the wounds were healed at the time of suture removal, and there were no incidences of wound infection, necrosis,



**Figure 3: (a) Transverse cervical skin incision. (b) Sutures taken at an approximate distance of one-fourth of the length of incision from either end. (c) Sutures taken too close to the corners of incision results in a more horizontal rectangular window. (d) Sutures taken closer to the middle of the incision, results in a vertical rectangular window**

gaping or bruises at the site of stay sutures. At follow-up of approximately 4 weeks, the scar appeared to be fairly acceptable cosmetically [Figure 5].

## DISCUSSION

There has been increasing concern about cosmesis, and invisible postoperative scars of the face and neck as these are considered to be the most important parts of human body regarding beauty.<sup>[4]</sup> As discussed above, transverse skin incisions offer more cosmetically acceptable results whereas a vertical skin incision allows for greater exposure and is particularly useful for a multilevel procedure.

Few studies in the past claims that although a transverse skin incision for anterior cervical spine surgery gives an excellent cosmetic result, it is not extensible. Therefore techniques to identify the optimal level of transverse skin incision have been described by a few<sup>[8,9]</sup> or the use of two transverse incisions for multilevel fusion has been suggested.<sup>[10]</sup> Utter<sup>[7]</sup> stated that a vertical incision is not a requirement for anterior cervical corpectomy even in the multilevel reconstruction. Ventral plating over a long segment is aided by the additional exposure and also requires additional soft-tissue retraction to triangulate the screws at either end and for plate placement. Cervical corpectomy without plating typically does not require this additional exposure or retraction.

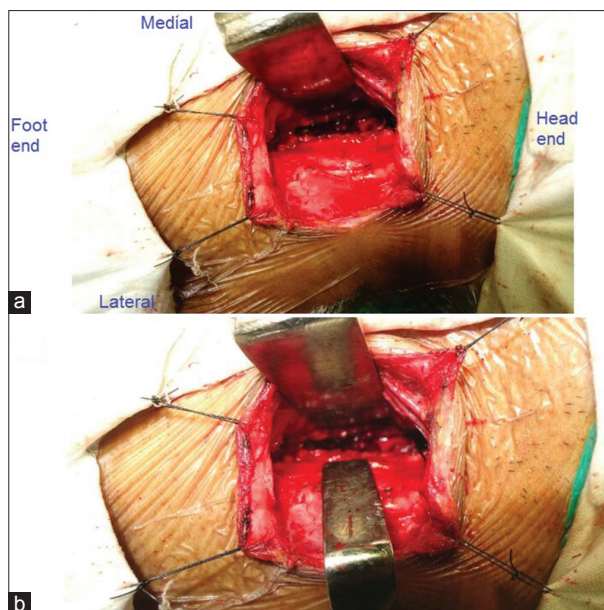


Figure 4: Medio-lateral retraction in a case of two-level corpectomy.

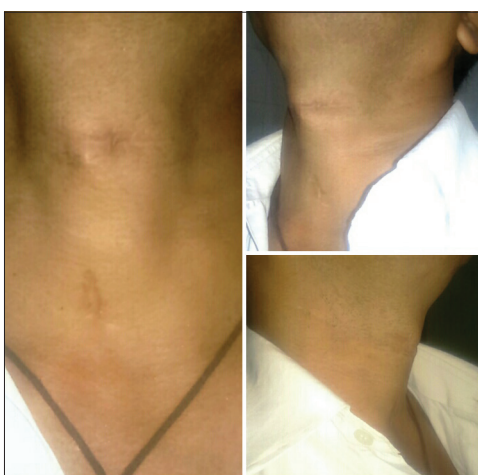


Figure 5: Appearance of the surgical scar at 4 weeks of follow up

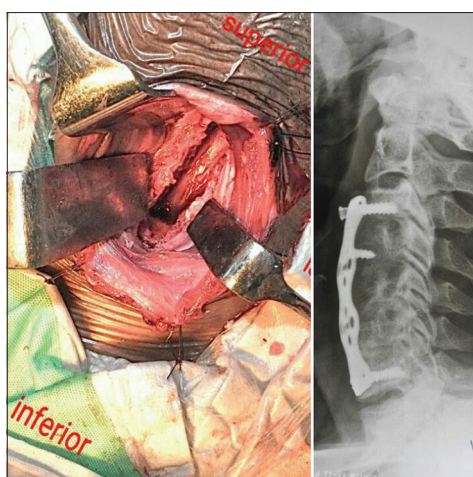


Figure 6: An intraoperative image and a postoperative radiograph at 3 months follow-up of a case involving three-level corpectomy using a transverse incision and stay sutures

However, in our experience, a transverse skin incision taken approximately in the middle of the working field and dissected well in fascial planes from superficial to deep prevertebral fascia, followed by the placement of stay sutures as described, offers an excellent exposure. It provides enough of an operating window to perform a hassle surgery involving even up to three-level corpectomy and fixation (five vertebral levels), without an additional need of exposure [Figure 6]. To achieve the maximum possible exposure, it is of vital importance to dissect all the fascial planes equally up to the breadth/width of the required field of work.

It is important to pass these sutures through the platysma and dermis but not piercing the skin to provide adequate strength without causing unsightly bruising. Stay sutures taken through the subcutaneous layer and platysma leaves the skin without blemishes and provides enough strength to handle the suture tension. Since the stay sutures take the platysma along with the subcutaneous tissue, it effectively creates a vertical rectangular window as good as a longitudinal incision thus requiring only mediolateral retraction. We thus support the fact that the use of stay sutures nullifies the need for a superior and an inferior retractor,<sup>[7]</sup> requiring only two retractors. Medial one is used for retracting the tracheoesophageal complex whereas the lateral one serves as a protective retractor for the great vessels.

Stay sutures taken in diagonally opposite sequence helps to achieve adequate and equal exposure of all the four corners. In addition, the use of plastic adhesive drapes is important to provide a rigid and stiff surface over which sutures can be tied. A loose and improperly draped surrounding will not provide adequate tension in the sutures and attempting to take stay sutures through such a drape would pull it into the operative field failing to serve the purpose.

## CONCLUSION

We hereby propose this simple and easy method of using stay sutures in the anterior approach to cervical spine for gaining multilevel access using a transverse skin incision providing the best possible cosmetic results with adequate exposure, doing justice to underlying pathology. The study alleviates the fear of extensibility of a transverse incision as a significant number of our cases involved a multilevel exposure with a few involving even three-level corpectomy or five levels of fixation. It provides an excellent exposure of the surgical field allowing the surgeon to operate, without any obstruction and glare in the way with the biggest advantage being its simplicity of use and the cost. However, it does not replace a careful operative technique and vigilant postoperative observation.

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### Conflicts of interest

There are no conflicts of interest.

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