

## Short Communication

# Whether Superficial Abdominal Reflex is Affected by Subcostal Transverse Abdominal Incisions? A Prospective, Observational Early Experience

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ABSTRACT

**Introduction:** Superficial abdominal reflex (SAR) is an important part of the neurologic assessment. It is normally present and may be present or absent in various physiological as well as pathological conditions. The presence of an abdominal incision creates a dilemma in the mind of the clinician for it affecting this reflex. As there is no literature on this, we decided to study the effect of abdominal incisions on SAR. **Materials and Methods:** It was a prospective, observational study. We evaluated the patients requiring transverse subcostal incision (range 3–12 cm) both preoperatively and postoperatively, for their abdominal reflexes. Patients with preoperative normal and symmetrical abdominal reflexes were included in the study. Postoperatively, we compared the change of SAR with the preoperative status and analyzed the data. **Results:** A total of 94 patients underwent surgeries, out of which 54 patients came under inclusion criteria, comprising 36 males and 18 females. Subcostal transverse abdominal incisions were made for surgeries including both gastrointestinal and ventriculoperitoneal shunts. SAR was found unaffected by the incisions in all patients. **Conclusions:** Although the study was small, subcostal transverse abdominal incisions were not found to affect SAR.

**KEYWORDS:** Neurologic examination, subcostal abdominal incisions, superficial abdominal reflex

## INTRODUCTION

Superficial abdominal reflex (SAR) is an integral part of the neurologic examination.<sup>[1,2]</sup> It may be absent physiologically in pregnancy, obesity, old age, and lax abdominal wall or pathologically in neurologic disorders.<sup>[3,4]</sup> Clinicians often get into a dilemma about the authenticity of the absence of SAR in the cases where abdominal incisions are already present. Literature mentions that posterolateral thoracotomy may abolish the SAR.<sup>[5]</sup> There is no study regarding the presence or absence of reflex after abdominal incision to the best of our knowledge. We present our early experience about the status of SAR after transverse subcostal abdominal incisions.

## MATERIALS AND METHODS

This was a prospective, observational clinical study done in our institute from November 2015 to

August 2016. Informed consent was taken from every patient regarding surgery and pre- and postoperative examination of his/her abdominal reflexes. Patients with normal symmetric preoperative SAR of all age groups (regardless of their obesity status, defined as body mass index >30) undergoing surgery, in which the right subcostal incision (ventriculoperitoneal [VP] shunt placement, cholecystectomy, third segment bypass, etc.) was made, were included in the study. Patients with asymmetrical and absent SARs were excluded from the study. Two neurosurgeons examined the reflex, by scratching the abdominal skin from outside to inside

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toward the umbilicus, both preoperatively and 1-month postoperatively at different times and recorded their responses separately. Postoperatively, the stimulus was given at both incision site and superior and inferior margins of incision in the same abdominal quadrant (right hypochondrium), and if it was elicitable in all three stimuli, then only it was considered present. Both clinicians were blinded for the other one's results.

Data were collected about the age, sex, diagnosis, preoperative presence of SAR, incision length, and postoperative presence/absence of SAR. Data were collected in the Microsoft Excel sheet and analysis was done for the change of SAR as compared to the preoperative status.

### Operative technique

Patients were operated under general anesthesia. Incisions were made 2.5 cm below the right subcostal margin as shown in Figure 1a and b. The length of the incision varied according to the pathology (range 3–4 cm in VP shunt surgeries and 6–12 cm in cholecystectomy and third segment bypass). After incising the skin, fascia, and anterior rectus sheath in the same line, the muscles (external oblique, internal oblique, and transverses abdominis) were split along its fibers, and posterior rectus sheath and peritoneum were incised. After the surgery, the anterior rectus sheath was closed with polyglactin 910 2-0 round-body needle (Vicryl, Ethicon Inc.) and skin with nylon 2-0 reverse

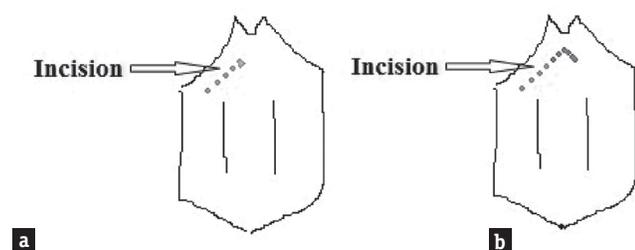
cutting needle (Ethilon, Ethicon Inc.). The SAR was examined preoperatively a day before the surgery and postoperatively after 1 month. The procedures were performed by the team of neurosurgeons (in case of VP shunt surgery) and gastrointestinal surgeons (in case of cholecystectomy and third segment bypass).

### RESULTS

A total of 94 patients underwent surgeries, out of which only 54 patients had preoperative normal symmetrical abdominal reflexes, and only these were included in the study. There were two obese females but they did not have normal preoperative reflexes so were excluded along with the other 38 patients. The age range was 6 months to 60 years. There were 36 males and 18 females in the study. The incision range was 3–12 cm. The diagnosis for which the surgeries were done, procedures performed, age (mean and standard deviation [SD]), incision length (mean and SD), and preoperative and postoperative change of SAR are shown in Table 1. We made subcostal incisions for surgeries including both gastrointestinal (cholecystectomy and third segment bypass) and VP shunts (for tuberculous meningitis with hydrocephalus, Dandy–Walker syndrome, and posterior fossa masses). Every patient had preserved SAR after the surgery and had no change in it. Both neurosurgeons had identical responses.

### DISCUSSION

SAR is an important part of the neurologic examination. It is elicited by scratching the skin of abdomen from outside to inside, toward the midline, resulting in the movement of umbilicus toward the stimulus.<sup>[6]</sup> It is symmetrically present in 60%, asymmetric in 14%, absent in at least one quadrant in 11%, and absent in all quadrants in about 15% of participants.<sup>[7]</sup> The presence of the reflex is normal, while its absence may be normal or abnormal. Its absence may be found in obesity, pregnancy, upper motor neuron lesion, and advanced age. Since posterolateral thoracotomy can cause



**Figure 1:** (a) Incisions made about 2.5 cm below the right subcostal margin. The length of the incisions in ventriculoperitoneal shunt surgeries ranged 3–4 cm and 6–12 cm in cholecystectomy. (b) For third segment bypass, the incision crossed the midline, as shown

**Table 1: Diseases, procedures performed, numbers, age (mean and standard deviation), incision length (mean and standard deviation), preoperative and postoperative status of superficial abdominal reflex**

Diseases	Procedures performed	n	Mean (SD)		Preoperative presence of SAR	Postoperative presence of SAR
			Age (years)	Incision length (cm)		
TBM with hydrocephalus	VP shunt	39	11.4 (11.1)	4 (1)	Yes	Yes
Posterior fossa mass	VP shunt	6	27.2 (21.5)	4 (1)	Yes	Yes
Cholelithiasis	Cholecystectomy	5	40.0 (9.4)	7 (1)	Yes	Yes
Hilar cholangiocarcinoma	Third segment bypass	2	48.5 (9.2)	11 (1)	Yes	Yes
Dandy-Walker syndrome with hydrocephalus	VP shunt	2	1.8 (1.8)	3 (1)	Yes	Yes
Total		54			54	54

SD: Standard deviation, SAR: Superficial abdominal reflex, VP: Ventriculoperitoneal, TBM: Tuberculous meningitis

disappearance of SAR,<sup>[5]</sup> there is obvious doubt about SAR after abdominal incisions.

A wide range of age group and both neurologic and gastrointestinal surgeries were included to ensure generality. The examination by two separate neurosurgeons and their blinding with each other's responses assured the correct interpretation of this subjective reflex.

This study showed that if SAR is present preoperatively, then it is not affected by the transverse subcostal abdominal incisions. Reasons for these findings may be related to the anatomical innervations. Afferent innervations of SAR are the dermatomal distribution of nerves, and efferent innervations are the segmental innervations of the abdominal muscles. These nerves travel in the transverse fashion. A subcostal incision in line with the normal course of the nerves could have saved nerves. Further, muscles were split alongside their fibers and were not cut, could be responsible for sparing of the nerves.

The results suggest that one should have a high suspicion about neurologic cause when there is the absence of SAR in subcostal quadrant in the presence of transverse incision. This can be applied to all age groups and for both sexes. Many patients, such as obese and with lax abdominal wall, may be having previously absent reflexes, so one should not have confusion for the transverse subcostal incisions as a cause for absent SARs.

A vertical incision can cut the afferent innervations and thus can be expected to interfere with the SAR. However, as in practice, one sees the resolving of numbness after a skin cut in weeks to months; therefore, one can also expect the normalization of the afferent arc

of this reflex after some time. This can be a topic for future research.

There were limitations in this study. First, the study group was small. Second, one can interpret results only for transverse subcostal incisions and cannot generalize the results for other incisions. Third, the incisions were comparatively of small size, and larger incisions and stretching of the wound during retraction may affect the reflex.

## CONCLUSIONS

SARs are not affected by transverse abdominal incisions. More work is needed for the generalization of results for other incisions.

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## Conflicts of interest

There are no conflicts of interest.

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