

# Rectus sheath plication in abdominoplasty: an assessment of its longevity with ultrasound

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## Aims of the study

Rectus plication is commonly performed during abdominoplasty to restore abdominal contour. Only a few long term studies have investigated the durability of rectus plication with the efficacy of plication demonstrated using small number of patients and a short term follow-up<sup>1-3</sup>.

The aim of this study was to assess the long term durability of standard vertical plication of the anterior rectus sheath using ultrasound.

## Methods

A prospective study of patients that underwent abdominoplasty with rectus plication by the senior author from 2006 was undertaken. Plication was performed using two loop 0 nylon sutures on a round bodied needle (Ethicon™): the first from the umbilicus to xiphisternum and the second from the umbilicus to the symphysis pubis.

Data was collected on demographics, risk factors, surgical outcomes and rectus diastasis. Ultrasound, performed by a single senior radiologist using a standardised probe was used to measure rectus diastasis. Ultrasound scans measured preoperatively and post-operatively at 3, 6, 12 months at 3 fixed points: at the umbilicus, 3cm above and 3cm below the umbilicus.

## Definition of diastasis

There is no consensus in opinion regarding the normal distance between the rectus muscles. Very few studies have tried to evaluate the abdominal muscles in normal women and define rectus diastasis:

### Beer Classification<sup>4</sup>

Beer et al (2009) studied 159 healthy nulliparous women aged between 20 and 45 years and with a BMI < 30. Using ultrasound, they defined the normal width of the linea alba as:

- up to 15 mm at the xiphoid
- up to 22 mm at a point 3cm above the umbilicus
- up to 16mm at a point 2cm below the umbilicus

### Rath Classification<sup>5</sup>

Rath (1996) defined rectus diastasis after studying the linea alba in 40 fresh cadavers and 40 abdominopelvic CT scans. However they included patients of both sexes, with variable BMI and ages and fail to enclose any previous pregnancies.

*Patients < 45 years diastasis defined as:*

- 10 mm above the umbilicus
- 27 mm at the umbilicus
- 9 mm below the umbilicus

*Patients > 45 years diastasis defined as:*

- 15 mm above the umbilicus
- 27 mm at the umbilicus
- 14 mm below the umbilicus

The Rath classification is based on a non-homogeneous patient population and the published parameters were therefore not used in this study to define rectus diastasis.

## Results

In total, 28 female patients were recruited into the study. Age: mean 36 years, range 23–47 BMI: mean 26, range 21–37

*Recorded risk factors include:*

- Smoking 33%
- Hypertension/IHD 21%
- Asthma/COPD 14%
- Diabetes 11%

*18% (n=5) of patients had no previous surgery while the remaining 82% (n=23) had bdominal surgery including:*

- C-sections only 36% (n=10)
- Other open procedures 25% (n=7)
- Laparoscopic procedures only 21% (n=6)

Weight of the resected tissue: mean 920g, range 320g to 2900g

Mean follow up time in outpatient clinic: 23 months

## Diastasis Results

According to the Beer classification, none of the patients in the study had recurrent diastasis. All ultrasound measurements at 12 months post-operatively were within those defined by Beer et al (2009).

A significant reduction was noted in the mean distance between rectus muscles before plication and 12 months after surgery: (table)

Level	Mean pre-operative distance	Mean post-operative distance
Above Umbilicus	32 mm	9 mm
At Umbilicus	30 mm	10 mm
Below Umbilicus	22 mm	6 mm

Pre-operative rectus distance did not influence post-operative diastasis: (table)

Level	Mean Rectus Distance (mm)		P-value
	Previous surgery	No Previous surgery	
Above Umbilicus	25.6	21.78	0.53
At Umbilicus	20.5	9	0.12
Below Umbilicus	21	24.57	0.49

## Discussion

Summary of previous studies investigating durability of rectus plication :

### Nahas et al, 2005:

- Prospective study with 12 female patients
- Plication with a two layer 2/0 Nylon suture
- Pre-operative assessment with CT 3cms above and 2cms below umbilicus
- Post-operative scan at 3 weeks and long term (76 to 84 months) at same levels
- No recurrence of diastasis at either level in any of the patients
- Small patient number with long term follow-up

### Nahas et al, 2001:

- Patients randomly allocated to PDS or Nylon group
- Two layer suture plication: 10 patients corrected with PDS and 10 with Nylon
- Pre-operative CT assessment 3cms above and 2cms below umbilicus (at fixed bony points)
- Two post-operative CT scans at 3 weeks and 6 months
- Good correction of diastasis in all patients with no recurrence
- Small patient numbers in each group & short term follow-up

### Van Uchelen et al, 2001:

- Absorbable suture (vicryl) used for rectus plication
- Variable vicryl suture type used in patients with multiple operators
- No pre-operative ultrasound scans to determine diastasis
- Retrospective study with patients invited back for ultrasound evaluation
- 40 patients evaluated and 40% had diastases according to Rath's classification

## Conclusions

Rectus plication with a non-absorbable suture demonstrates long term durable results without recurrence of the diastasis post-operatively. Previous abdominal surgery did not appear to have a significant effect on the durability of the corrected diastasis.

## References

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