

## Original Article

# Determining anatomical position of the umbilicus in Iranian girls, and providing quantitative indices and formula to determine neo-umbilicus during abdominoplasty

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### ABSTRACT

**Background and Aim:** The umbilicus plays an important role in the aesthetic appearance of the abdomen. So, its restoration during reconstructive surgeries, such as an abdominoplasty, is a challenge. The aim of this study was to evaluate quantitative indices based on constant skeletal points in the anterior wall of abdomen in order to provide an appropriate site of a neo-umbilicus during an abdominoplasty. **Materials and Methods:** In this descriptive, cross-sectional study, we enrolled 65 young adult girls (20–25 years old) who were nulliparous, nulligravid, and without any history of surgery. Weight, height, distance from xiphoid to umbilicus (Xu), distance from the pubic symphysis to xiphosternum (Xp), and anterior superior iliac spine (interASIS) distance of the subjects were measured. Data were analysed by SPSS ver. 16 using descriptive statistics and multiple regression tests in order to present a formula (equation). **Results:** Mean age was  $22.74 \pm 1.51$  years, mean weight  $54.98 \pm 6.51$  kg, mean height  $160.91 \pm 4.11$  cm and body mass index (BMI) was calculated to be  $21.25 \pm 2.61$  kg/m<sup>2</sup>. Mean Xp distance was  $32.26 \pm 2.23$  cm and mean Xu distance was  $17.11 \pm 1.64$  cm. Xu/Xp ratio (ratio of umbilicoxiphoid distance to puboxiphoid distance) was  $53.06 \pm 3.9\%$ . Data were analysed using multiple regression test and likelihood ratio. The formula used in determining the appropriate site of neo-umbilicus during abdominoplasty was suggested:  $Xu = -0.98 + 0.91Xp - 0.07H$ . **Conclusion:** By applying these quantitative methods, the natural site of neo-umbilicus could be determined. This may reduce practice errors and increase patient satisfaction. In addition, these findings provide plausible evidence to defend against possible legal complaints.

### KEY WORDS

Abdominoplasty; neo-omphaloplasty; umbilicus

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### INTRODUCTION

Abdominoplasty is a type of plastic surgery, that for the most part, has aesthetic purposes.<sup>[1]</sup> In recent years, abdominoplasty surgery has become a common procedure among women who look to improve their figures. One of the most important steps in this surgical

procedure is to determine the new position of umbilicus. Most patients are concerned about the appropriate position of neo-umbilicus after abdominoplasty. Patients who are unsatisfied with the post-operative position of their umbilicus, aside from tolerating the emotional toll of an unsatisfactory outcome and/or extra expense and discomfort of having a corrective procedure, may sue the surgeon.<sup>[2]</sup> There is a lack of consensus among plastic surgeons on how to approach the skin incision during an abdominoplasty, to obtain the best result in repositioning umbilicus.<sup>[3]</sup> Evidenced-based approach to abdominoplasty is needed to assist plastic surgeons in self-assessment and benchmarking of their techniques.

Placing neo-umbilicus in its mother-nature position<sup>[4]</sup> is not as easy as it seems. Existing evidence demonstrates that marking the appropriate position pre-operatively is not an ideal method because it can be erased by the time the umbilicus is brought out.<sup>[5]</sup> Lanugo hair on the abdomen, which is present in males and to a lesser extent in females, converges over and points towards the linea alba in the midline, and when visible can determine the right place of the umbilicus.<sup>[5]</sup>

Different studies are available discussing the anatomic position of umbilicus.<sup>[6-9]</sup> It is stated that umbilicus is not always exactly in the midline in normal individuals, but frequently lies lateral to the midline axis.<sup>[10]</sup> Surgeons agree, to a large extent, that the midway between the two iliac crests is the most appropriate position for umbilicus.<sup>[11]</sup> Others have suggested the ratio of the distance from umbilicus to xiphisternum and the distance from umbilicus to pubic symphysis of 1.6:1.<sup>[12]</sup>

Some plastic surgeons release the umbilicus either at the beginning of the operation or during the surgery, by elevating the infra-umbilical skin flap, so that the umbilical stalk is protected from accidental injury. Once the umbilical stalk is safely isolated, a 3/0 silk marker stitch can be placed on the superior side of the umbilicus. This helps with orientating the umbilicus and preventing accidental torsion. It also helps with delivering it through the new incision in the abdominal wall.<sup>[13]</sup>

The present study was performed to determine the normal anatomical position of the umbilicus in a sample of Iranian women and to offer a formula for repositioning neo-umbilicus during abdominoplasty.

## MATERIALS AND METHODS

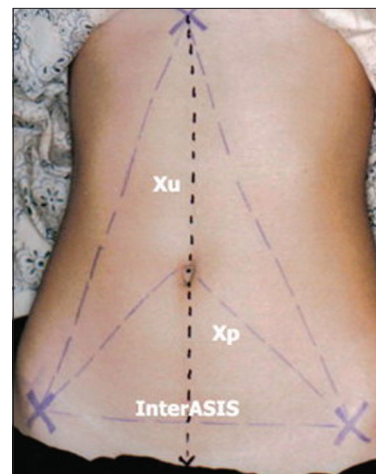
The implementation of this cross-sectional study was approved by the Scientific and Ethical Review Boards of Urmia University of Medical Sciences (UMSU), Iran. Sixty-five adult girls (all from Azerbaijan province) without any history of previous surgery, who were nulliparous and nulligravida, consented to participate in the study and were enrolled. The study participants were evaluated to record their age, height, weight, body mass index (BMI), distance between umbilicus and xiphisternum (Xu), distance between pubic symphysis and xiphisternum (Xp) and anterior superior iliac spine (interASIS) distances [Figure 1].

Data were analysed using descriptive statistics and multiple linear regressions with likelihood ratio test for data reduction and simplicity of the equation. Data analysis was performed by SPSS software version 16.

## RESULTS

Mean age of the study group was  $22.74 \pm 1.51$  years (Mean  $\pm$  SD). Mean weight was  $54.98 \pm 6.51$  kg. Mean height was  $160.91 \pm 4.11$  cm. Mean BMI was calculated to be  $21.25 \pm 2.61$  kg/m<sup>2</sup>. Mean Xp distance was  $32.26 \pm 2.23$  cm and mean Xu distance was  $17.11 \pm 1.64$  cm among the study group subjects. The Xu/Xp ratio was calculated as  $53.06 \pm 3.9\%$ . Using multiple linear regressions with likelihood ratio tests, we developed a method to estimate an appropriate anatomical position for umbilicus, which is demonstrated in the following formula:

$$Xu = -0.98 + 0.91Xp - 0.07H$$



**Figure 1:** Demonstrating distance between umbilicus and xiphisternum (Xu), distance between pubic symphysis and xiphisternum (Xp), anterior superior iliac spine (interASIS) distances

Xu represents distance between umbilicus and xiphisternum, Xp represents distance between pubic symphysis and xiphisternum and “H” denotes the height.

## DISCUSSION

The current study provides a quantitative method to determine the most appropriate place of umbilicus during an abdominoplasty operation. Abhyankar *et al.* in India performed a similar study on 75 cosmopolitan adult girls.<sup>[12]</sup> In their study, the ratio of the distance between the xiphisternum and the umbilicus to the distance between the umbilicus and the pubic symphysis was 1.6:1. Stefan Danilla from Chile performed further statistical analysis on the data that Abhyankar *et al.* provided in their article, and presented a formula.<sup>[14]</sup>

We used the same method and provided a formula for determining the anatomical position of umbilicus in a sample of Iranian Azerbaijani adult girls. This formula and the resultant ratio could be used to determine appropriate position of the neo-umbilicus during abdominoplasty. This may increase the likelihood of patients’ satisfaction with the surgery outcome and the aesthetic appearance of the abdomen post-abdominoplasty. Moreover, our study adds to the existing efforts in accumulating evidence-based approach in repositioning umbilicus during an abdominoplasty operation, subsequently yielding favourable outcomes and protecting surgeons from allegation of medical malpractice. Further studies are needed to apply and test our formula in abdominoplasty surgery in different samples of adult women.

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