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Determination of Appropriate Umbilicus Position during Abdominoplasty in Male Patients

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Background: Abdominoplasty techniques are well documented. The ideal position of the umbilicus has, however, received limited attention. Unfortunately, umbilicus position is not universally agreed upon in male cosmetic abdominoplasty. This study was conducted to determine the ideal umbilicus anthropometric measurements in young men, and the relationships between umbilical position and anterior trunk and torso reference points that may be applicable to intraoperative positioning. It is aimed also at investigating whether umbilicus position would be more accurately determined by considering nipple position instead of the abdominal crease, as recently proposed.

Methods: Several anthropometric measurements of various anterior abdominal and thoracic landmarks were conducted on 60 young and middle-aged male volunteers and 30 cadavers at São Paulo city. All statistical analysis was completed using Stata software.

Results: Of all the measured reference points, a much stronger correlation (0.513) was demonstrated between umbilicus-anterior axillary fold (U-AX) and inter-nipple (N-N) distances with a constant golden number ratio relationship (N-N = U-AX × 0.618) compared with the weak correlation of 0.034 between umbilicus-xiphisternum and umbilicus-abdominal crease. In 75% of volunteers, the calculated U-AX was within ±3 cm of actual measurement, and in 33.33% within ±1 cm.

Conclusions: U-AX = 1.618 × N-N equation is more predictive of adequate umbilicus repositioning during abdominoplasty in male patients. Chest and abdomen of men are a single aesthetic unit. Proper positioning of the nipples and umbilicus, as well as harmonious abdominal and torso proportions are critical for an optimal final aesthetic outcome. *(Plast Reconstr Surg Glob Open 2023; 11:e5342; doi: 10.1097/GOX.0000000000005342; Published online 16 October 2023.)*

INTRODUCTION

The umbilicus is a superficial scar and an essential aesthetic feature of abdominal appearance.[1–4] Anecdotally, the painting *Adam and Eve* by Jean-Baptiste Santerre (1651–1717) lacking an umbilicus caused a scandal, which later led to the addition of an umbilicus to the painting.[5] If absent or not well-positioned, it can result in an unnatural looking abdomen.[2,4,6–9]

Despite that its physiological and aesthetic importance have long been recognized, the umbilicus was routinely discarded during surgery until the late 1950s.[10,11] With increasing appreciation of its importance in defining a harmonious anterior trunk, umbilical transposition performed toward the end of the surgery was described by Vernon in 1957.[12] However, despite abundant literature on abdominoplasty, limited attention has been directed toward the ideal umbilicus position.[3,13,14]

Obviously, when judging an abdomen for its attractiveness, umbilicus position and shape cannot be ignored.[6,15] Achieving a desirable result is obtained only by avoiding an undesirable high- or low-riding navel.[16] Numerous techniques have been described for the restoration of the umbilicus in its new position[15]; there is, however, no universal consensus and standardization regarding ideal position and shape.[17,18] Although some guidelines do exist, position remains dependent on individual surgeons' artistic sensibility and subjective assessment of beauty.[17]

Increasing demand among young men for enhanced aesthetics of abdominal contour has been noted lately. With the increasing popularity of bariatric surgery, it is projected that the proportion of men seeking abdominoplasties will steadily increase.[19] It is questionable, however,

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whether concepts of umbilical position and abdominal aesthetics that have been mostly determined by two-dimensional photographs of top female models, most probably edited, apply to the general population and, particularly, to male patients.[13]

Strongly believing that the anterior male trunk aesthetic unit encompasses both the abdomen and thorax and that the nipples and umbilicus, being the main visual aesthetic landmarks, should be in a harmonious relationship, we hypothesize that a fixed relationship between the umbilicus and nipple positions with some anterior trunk and torso reference points does exist. This relationship could be favorably applicable in male abdominoplasty for correct intraoperative umbilical positioning as well as for preoperative planning, particularly when the original umbilical location has been altered by weight change or previous surgery.

Describing the horizontal and vertical coordinates of nipple position in male patients, the senior author has previously reported a golden number correlation between N-N (inter-nipple) and U-AX (umbilicus-anterior axillary fold) distances (N-N = U-AX × 0.618),[20–22] applicable also for determination of umbilicus position. In line with a study published by Visconti et al[17] on female models, Graham et al[23] proposed another formula after analysis of 81 online photographs of top male models to determine umbilicus position based on a golden number correlation between U-XI (umbilicus-xiphisternum) and U-ACr (umbilicus-abdominal crease) distances (U-XI = U-ACr × 1.618). We believe, however, that nipples are more obvious landmarks and easier to define than the abdominal crease and that inter-nipple distance is more appropriate for accurate determination of umbilical position in male abdominoplasty.

Takeaways

Question: What is the ideal anthropometric measurements of the umbilicus position during abdominoplasty in male patients?

Findings: The U-AX = 1.618 × N-N equation is more predictive of adequate umbilicus repositioning during abdomino- plasty in male patients.

Meaning: Proper positioning of the nipples and umbilicus, as well as harmonious abdominal and torso proportions, are critical for an optimal final aesthetic outcome.

MATERIALS AND METHODS

Several anthropometric measurements of anterior abdominal and thoracic landmarks (Fig. 1) were conducted on two study groups. The first group consisted of 60 male volunteers without any history of previous abdominal or breast surgery, or massive weight loss. Subjects with skeletal thoracic or spinal deformity were excluded the same as men with grades III and IV gynecomastia. Measurements were made in the standing position. In case of discrepancy in measurement of paired

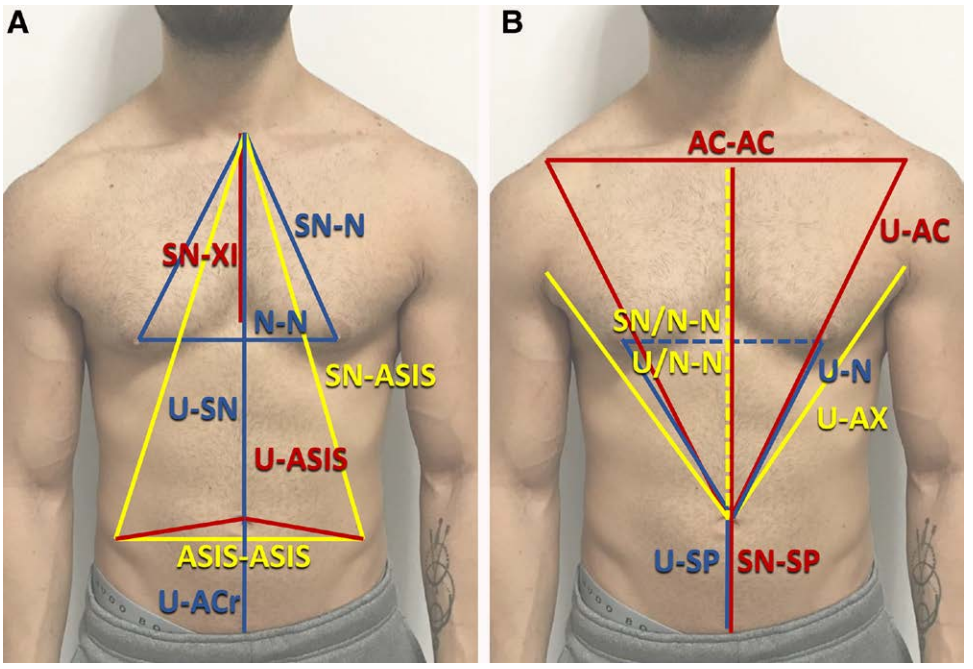

Fig. 1. The 16 anthropometric measurements were made on standing male volunteers. A, SN-N: sternal notch-nipple distance; SN-XI: sternal notch-xiphoid distance; SN-ASIS: sternal notch-anterior superior iliac spine; U-SN: umbilicus-sternal notch distance; U-ASIS: anterior superior iliac spine distance; ASIS-ASIS: interanterior superior iliac spine. B, AC-AC: inter-acromion distance; U-AC: umbilicus acromion distance; U-N: umbilicus nipple distance; U-SP: umbilicus symphysis pubis; SN-SP: sternal notch symphysis pubis distance; SN/N-N: sternal notch to inter-nipple line; U/N-N: umbilicus to internipple line.

landmarks, the mean was recorded. The study was conducted in accordance with the Declaration of Helsinki principles. Institutional review board approval was not required due to its noninterventional nature. Permission to use measurements for study purposes was obtained from all participants.

With the approval of the authority at the public morgue of São Paulo, associated with São Paulo University, similar measurements in the supine position were made on a second group of 30 male cadavers of mixed ethnicity, which were by law under the city's jurisdiction before mandatory burial within 24 hours.

For both study groups, calculations and correlations were conducted. Appropriateness of the two equations under question were evaluated with statistical regressions. *P* values less than 0.01 determined statistical significance for multivariate analysis. A multiple linear regression model was also applied. Adjusted R-squared values of 0.13 or less indicated poor; 0.13–0.26, moderate; and 0.26 or more, high goodness of fit. All statistical analysis was completed using Stata software (StataCorp. 2021. Stata Statistical Software: Release 17. College Station, Tex.: StataCorp LLC).

Table 1. Descriptive Statistics of 60 Male Volunteers and 30 Cadavers

Variable	Obs	Mean	SD	Min	Max
Male volunteers					
BMI	60	24.69833	2.729096	21	31
HT	60	1.788	0.066079	1.6	1.91
Age	60	27.75	6.902775	19	49
Cadavers					
BMI	30	25.09006	3.622323	19.47715	33.95062
HT	30	1.698667	0.0671967	1.6	1.8
Age	30	70.86667	13.77838	19	95

RESULTS

The mean age of volunteers was 27.8 years, mean height, 1.79 m; mean weight, 78.9 kg; and mean body mass index (BMI), 24.75 kg per m² (Table 1). The 95% confidence interval (CI) of the U-AX distance, determined by U-AX = 1.618 × N-N, and U-XI distance, determined by U-XI = U-ACr × 1.618, were calculated and were 1.032 ± 0.02, and 0.995 ± 0.04, respectively. Variance was found to be greater for U-XI/U-ACr compared with U-AX/N-N (0.023 versus 0.007), indicating that the equation described by Graham et al[23] is less accurate. Correlation analysis to the golden mean relating the two equations was performed. Stronger correlation was demonstrated with U-AX/N-N (0.513) when compared with U-XI/U-ACr (0.034), indicating that the U-AX/N-N equation is more closely related to the golden mean. In 75% of volunteers, calculated U-AX was within ±3 cm of actual measurement, and in 33.33% within ±1 cm.

R^2 was determined to evaluate appropriateness of data fit of both equations. For U-AX/N-N, adjusted R^2 was 0.251 with F(1, 58) = 20.8 and $P = 0.000$. It was significantly higher than for U-XI/U-ACr (adjusted $R^2 = 0.001$, F(1, 58) = 0.07, $P = 0.798$) (Tables 2 and 3). Adjusted R^2 for U-AX/N-N increases significantly (Table 4) when BMI is considered (adjusted $R^2 = 0.4319$, F(2, 57) = 23.43, $P = 0.000$). Grouping data by BMI categories, 38 subjects were normal weight; 19, overweight; and three, obese. Regression analysis conducted with overweight and obese

Table 2. U-AX = N-N × 1.618 Equation Regression

Source	SS	df	MS			
Model	**59.9083547**	**1**	**2.729096**	**No. Obs = 60**		
Residual	**167.074979**	**58**	**0.066079**	**F (1, 58) = 20.80**		
				Prob > F = 0.0000*		
				R-squared† = 0.2639		
				Adj R-squared‡ = 0.2512		
Total	**226.983333**	**59**	**6.902775**	**Root MSE = 1.6972**		
N-N	**Coefficient**	**SE**	**t**	***P*>I t I**	**95% CI**	
U-AX	0.3047996	0.0668363	40.56	00.000	0.1710122	0.435869
_cons	11.65899	2.64578	4.41	0.000	6.362886	16.9551

The data fit is highly significant ($P = 0.0000$).
*Prob > F is the probability of obtaining the estimated F-statistics or greater (the *P* value).
†R-squared is a statistical measure that indicates how much of the variation of a dependent variable is explained by an independent variable in a regression model.
‡Adjusted R-squared shows whether adding additional predictors improves a regression model or not.

Table 3. U-XI = U-ACr × 1.618 Equation Regression

Source	SS	df	MS			
Model Residual	**0.181430775 158.801903**	**1 58**	**0.181430775 2.73796384**	**No. Obs = 60**		
				F (1, 58) = 0.07		
				Prob > F = 0.7978		
				R-squared = 0.0011		
				Adj R-squared = –0.0161		
Total	**158.983333**	**59**	**2.69463277**	**Root MSE = 1.6547**		
N-N	**Coefficient**	**SE**	**t**	***P*>I t I**	**95% CI**	
U-ACr	0.0374084	0.1453207	0.26	0.798	–0.2534827	0.3282995
_cons	17.26623	1.634347	10.56	0.000	13.99473	20.53773

The data fit is not significant ($P = 0.7978$).

Table 4. U-AX = N-N x 1.618 Equation Regression Incorporating BMI, Overweight, and Obese Categories

Source	SS	df	MS	No. obs = 60 F (1, 58) = 23.43 Prob > F = 0.000 R-squared = 0.4512 Adj R-squared = 0.4319 Root MSE = 1.4783		
Model	102.410546	2	51.205273			
Residual	124.572787	57	2.1854875			
Total	226.982787	59	3.84717514			
N-N	**Coefficient**	**SE**	**t**	***P*> I t I**	**95% CI**	
U-AX	0.2271854	0.0608186	3.74	0.000	0.1053983	0.3489724
BMI	0.3249018	0.0736751	4.41	0.000	0.17737	0.4724337
_cons	6.696336	2.564632	2.61	0.012	1.560749	11.83192
Source	SS	df	MS	No. obs = 60 F (3, 56) = 17.59 Prob > F = 0.000 R-squared = 0.4852 Adj R-squared = 0.4576 Root MSE = 1.4446		
Model	110.124887	3	36.7082957			
Residual	116.858446	56	2.08675797			
Total	226.983333	59	3.84717514			
N-N	Coefficient	SE	t	*P*> I t I	95% CI	
U-AX	0.2241769	0.0605102	3.70	0.000	0.1029604	0.3453935
Over_weight	1.726373	0.4092742	4.22	0.000	0.9064979	2.546247
Obese	2.992996	0.9192123	3.26	0.002	1.151593	4.8344
_cons	14.14322	2.366751	5.98	0.000	9.402046	18.88439

U-AX = N-N x 1.618 equation regression with BMI incorporated results in a net increase in R-squared, indicating how much of the variation in U-Ax is explained by BMI. Regression analysis with overweight and obese categories as dummy variables revealed a slight increase in adjusted R2 value, suggesting some small nonlinear effect.

categories as dummy variables revealed a slight increase in adjusted R^2, suggesting some small nonlinear effect (adjusted $R^2 = 0.457$, $F(3,56) = 17.59$). Obesity had a larger effect than overweight (correlation coefficient 2.99 and 1.73, respectively). Regardless, this effect did not lead to a large difference, as the original regression showed BMI to positively correlate (Table 4). Regression within two BMI groups (normal weight and overweight) showed a nonsignificant change in U-AX. Though the correlation coefficient was greater for overweight (0.415 versus 0.210), the difference was not significant, as the CIs overlapped. Moreover, there was no correlation between N-N and BMI (0.034) in obese and overweight subjects, while a relatively small correlation (0.350) existed in normal weight subjects. Apparently, higher BMI has no effect on N-N distance and, subsequently, on calculations of umbilicus position (Fig. 2). Even though patient BMI does significantly impact the accuracy of the U-AX/N-N equation, it remains applicable to patients over a wide BMI range (Fig. 3).

Adding height to the regression did not result in significant increase in R^2 (adjusted $R^2 = 0,253$, $F(1,58) = 11.02$) (Table 5). Conducting the regression with age as a variable without distinct grouping demonstrated that age did not have a significant effect on U-AX (adjusted $R^2 = 0.2381$, $F(2,57) = 10.22$) (Table 6). With subjects grouped by age (≤30 years and >30 years), adjusted R^2 was 0.374 and $F(1,39) = 23.34$ for the younger age group, whereas for subjects older than 30 years, adjusted R^2 was 0.0656 and $F(1,17) = 2.27$ (Fig. 4).

Cadaver data descriptive statistics are shown in Table 1. Regression analysis of measurements did not demonstrate any significant correlation between umbilical position and N-N or U-ACr. Regression for the U-AX/N-N relationship showed $R^2 = 0.0406$ and adjusted $R^2 = 0.0063$ with a nonsignificant *P* value. Regression for U-XI/U-ACr resulted in $R^2 = 0.000$ and adjusted $R^2 = -0.036$ with a nonsignificant *P* value. When incorporating BMI, R^2 of U-AX/N-N increased to 0.3617 with adjusted $R^2 = 0.3144$; nevertheless, the *P* value was still not significant. Regression performed incorporating BMI for U-XI/U-ACr showed $R^2 = 0.029$ and adjusted $R^2 = -0.043$.

DISCUSSION

Though primarily determined by its deep anchoring,[3] umbilicus cutaneous surface repositioning is a main step during abdominoplasty. Ideal position has been debated for decades, and general consensus is still lacking.[6,10,17] Hoyos et al[7,8] reported that three localization modalities are mostly favored: (1) at 60% of the distance between the pubis and xiphoid process, measured from distal to proximal[24]; (2) at the intersection between the midline and a line crossing both anterosuperior iliac spines[25]; and (3) at a point located 15 cm above the pubic bone.[26]

In many anatomical descriptions, the transumbilical plane is described at the level between the third and fourth lumbar vertebrae in the supine position regardless of gender.[17,27] This, however, is of no practical value when performing surgery. Furthermore, with major reference points of abdominal surface topography being distorted or covered by surgical drapes, choosing the optimal site for naval repositioning is a real challenge.[27–29]

Downward umbilicus migration occurs with age together with "pooch" formation in men.[6] Gravity also affects umbilicus level in standing position.[30] Position also changes with scars, hernias, and pregnancy in women.[15,30,31] Despite reports that BMI does not influence its location,[26] a lower umbilicus is associated with increasing BMI.[5,32] Position may also be influenced by ethnicity,[17] as well as whether the patient is high waisted or low waisted.[33] Although many reports indicate that height does

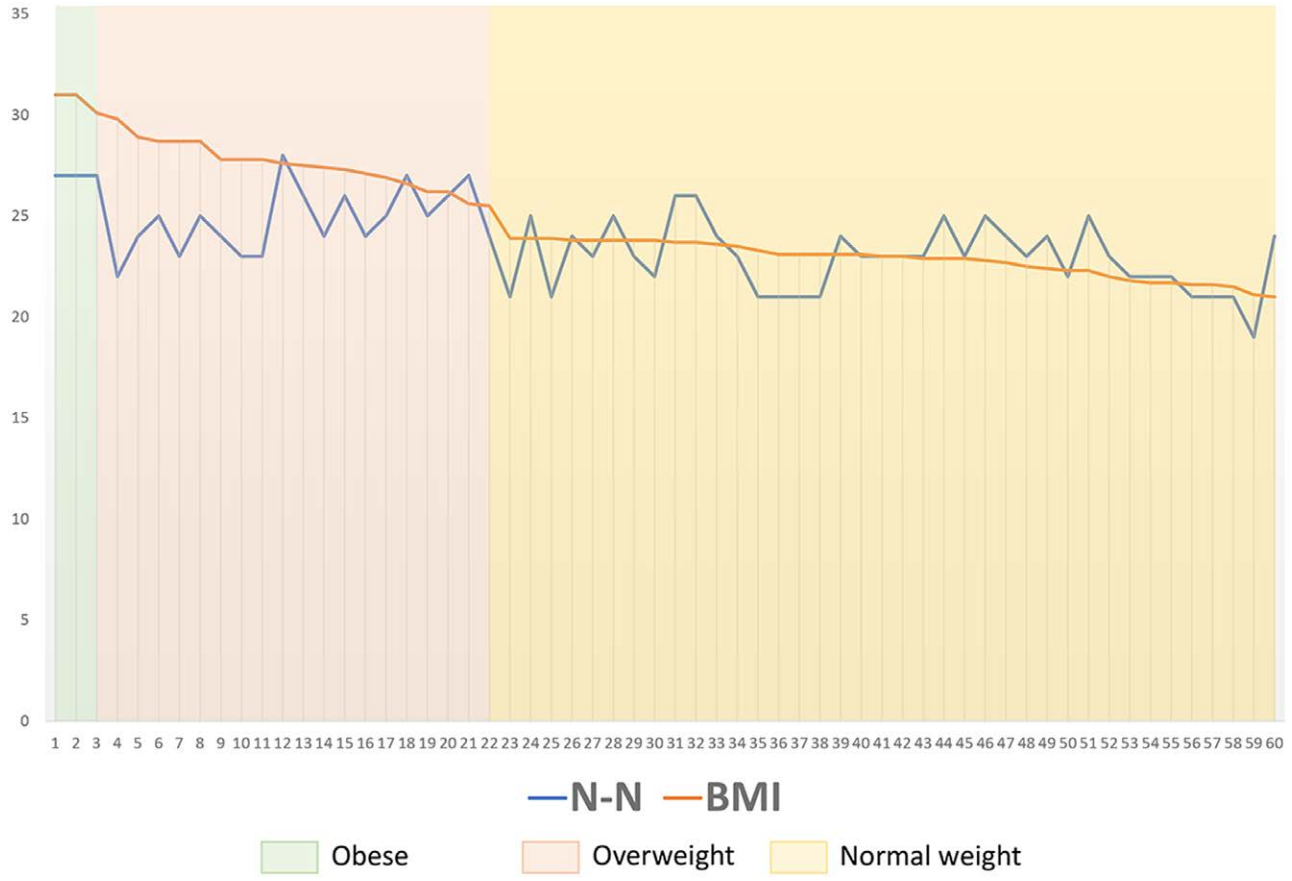

Fig. 2. Plot diagram of BMI and N-N of the volunteers in the study group (n = 60: normal, n = 38; overweight, n = 19; obese, n = 3). Higher BMI is not associated with a wider N-N distance.

not seem to have an impact, a tendency toward a higher umbilicus is reported in tall patients.[26] Characterized as a midline structure, the umbilicus is also rarely in the midline[17]; asymmetries are common.[3,30,34] Nevertheless, a recent computer-aided analysis of models' photographs concluded that the location of the aesthetically pleasing umbilicus is absolutely midline.[33]

Umbilical stalk position is a constant reference point and a predetermined unique feature for each patient.[1] It is generally recommended to place the umbilicus at the level of its pedicle base without any measurements.[1,4,17,35–37] To aid in exact localization, a suture can be attached to the xiphoid for reference.[38] Alternatively, use of a Lockwood marker,[28] spherical stainless-steel device,[39] magnet,[40] or even a shaped wire[41] have been described. However, unless the umbilicus is inset within the fascia and sutured to the abdominal flap exactly in correspondence with its projection,[37] an abnormal location may develop postoperatively when the umbilical stalk is long. It is worth noting that umbilicus relocation at the original stalk in all patients may not be optimal. Some patients with a high-riding umbilicus would benefit from lowering by 2–6 cm.[42]

Various authors have mentioned that the umbilicus is best located at the level of the waistline or at the top level of the iliac crest.[6,18,27,43] Umbilicopubic distance has been described to be consistently at 15 cm in patients 145–178 cm tall.[26] Others have recommended placing the umbilicus 3 cm cephalad to the anterior iliac spine level[44] or 4 cm below the waistline[12]; however, it is specifically recommended that final umbilical position should remain above the anterior superior iliac spine.[44] Furthermore, it is also advocated to locate the umbilicus between one half and two-thirds of the xiphoid-pubis distance.[1,18,45] The 15/10 rule and flap flipping technique defining an "expected zone" for umbilical positioning has been suggested, as well as an easy-to-use, intuitive yet precise, and simple guide.[15]

Abhyankar et al[46] demonstrated that a 1.6:1 ratio approximating the golden ratio exists between xiphisternum-umbilicus and umbilicus-symphysis pubis; the same ratio exists between umbilicus to anterior superior iliac spine and interanterior superior iliac spine. Different ratios of similar reference measurements were, however, reported in subjects of different ethnicities; African American people have a lower lying umbilicus compared with White people.[23,24,47–49] To accurately predict umbilicus-xyphoid distance, complex mathematical equations have also been proposed.[30,50,51] These, however, are too complicated to have any significant practical application.

Considering that bony landmarks are not reliable as reference points, Visconti et al[17] suggested that a golden ratio does not exist between the umbilicus-xyphoid and

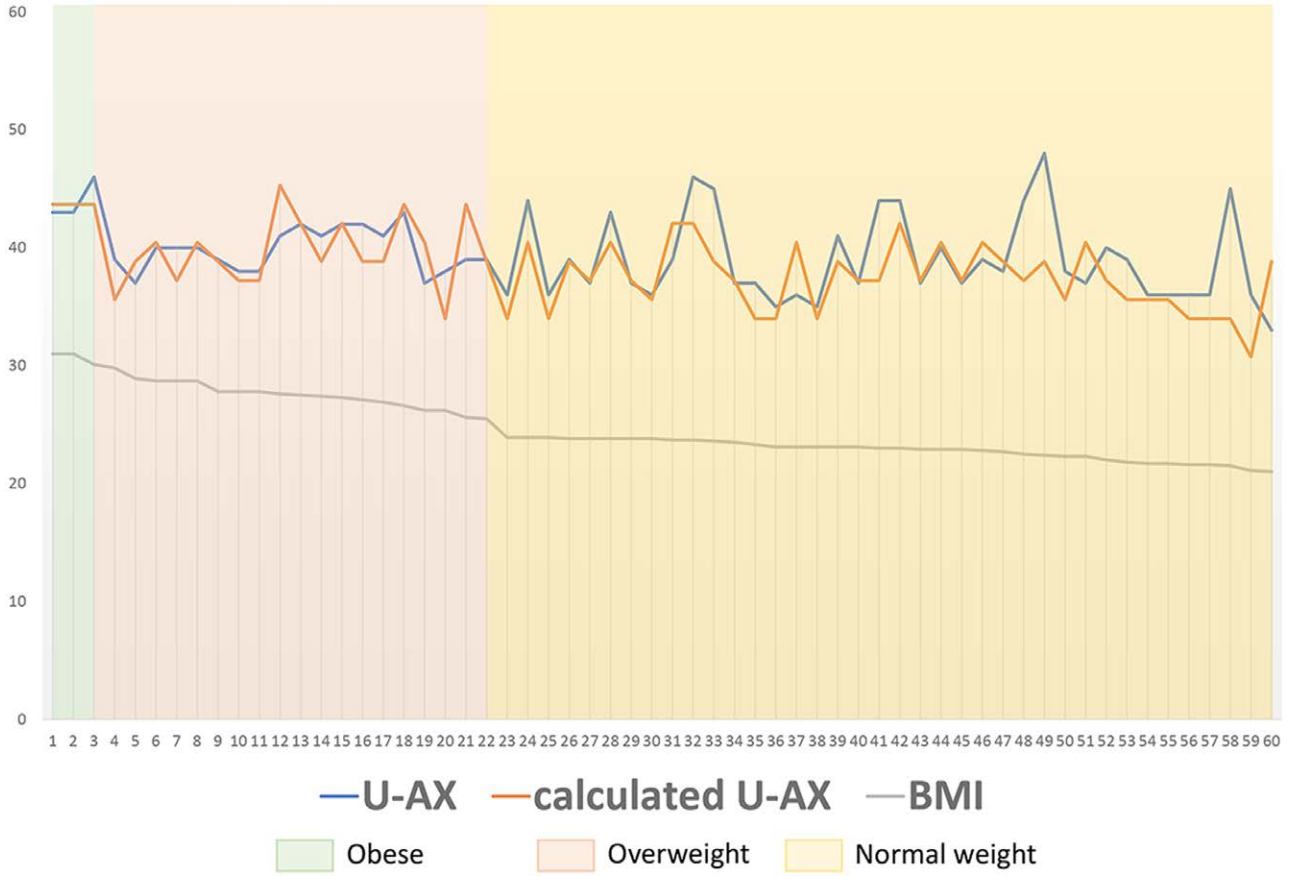

Fig. 3. Plot diagram of BMI, U-AX, and calculated U-AX of all the volunteers in the study group.

Table 5. U-AX = N-N × 1.618 Equation Regression with Height Incorporated Did Not Yield Any Increase in R-squared, Indicating That U-AX Is Independent of Height

Source	SS	df	MS			
Model	63.3037501	2	31.6518751	No. Obs = 60		
Residual	163.679583	57	2.87157164	F (1, 58) = 11.02		
				Prob > F = 0.0001		
				R-squared = 0.2789		
Total	226.983333	59	3.84717514	Adj R-squared = 0.2536		
				Root MSE = 1.6946		
N-N	Coefficient	SE	t	*P* > I t I	95% CI	
U-AX	0.3163596	0.0675729	4.68	0.000	0.1810471	0.451672
ht	–3.647001	3.353903	–1.09	0.281	–10.36308	3.069074
_cons	17.72379	6.171341	2.87	0.006	5.365888	30.08168

Table 6. U-AX = N-N × 1.618 Equation Regression with Age Incorporated Did Not Yield Any Increase in R-squared, Indicating That U-AX Is Independent of Age

Source	SS	df	MS			
Model	59.909833	2	29.9549165	No. Obs = 60		
Residual	167.0735	57	2.93111404	F (2, 57) = 10.22		
				Prob > F = 0.0002		
				R-squared = 0.2639		
Total	226.983333	59	3.84717514	Adj R-squared = 0.2381		
				Root MSE = 1.712		
NN	Coefficient	SE	t	*P* > I t I	95% CI	
U-AX	0.3045596	0.0682611	4.46	0.000	0.167869	0.4412502
Age	0.0007342	0.0326929	0.02	0.982	–0.0647321	0.0662006
_cons	11.64808	2.7122715	4.29	0.000	6.215965	17.0802

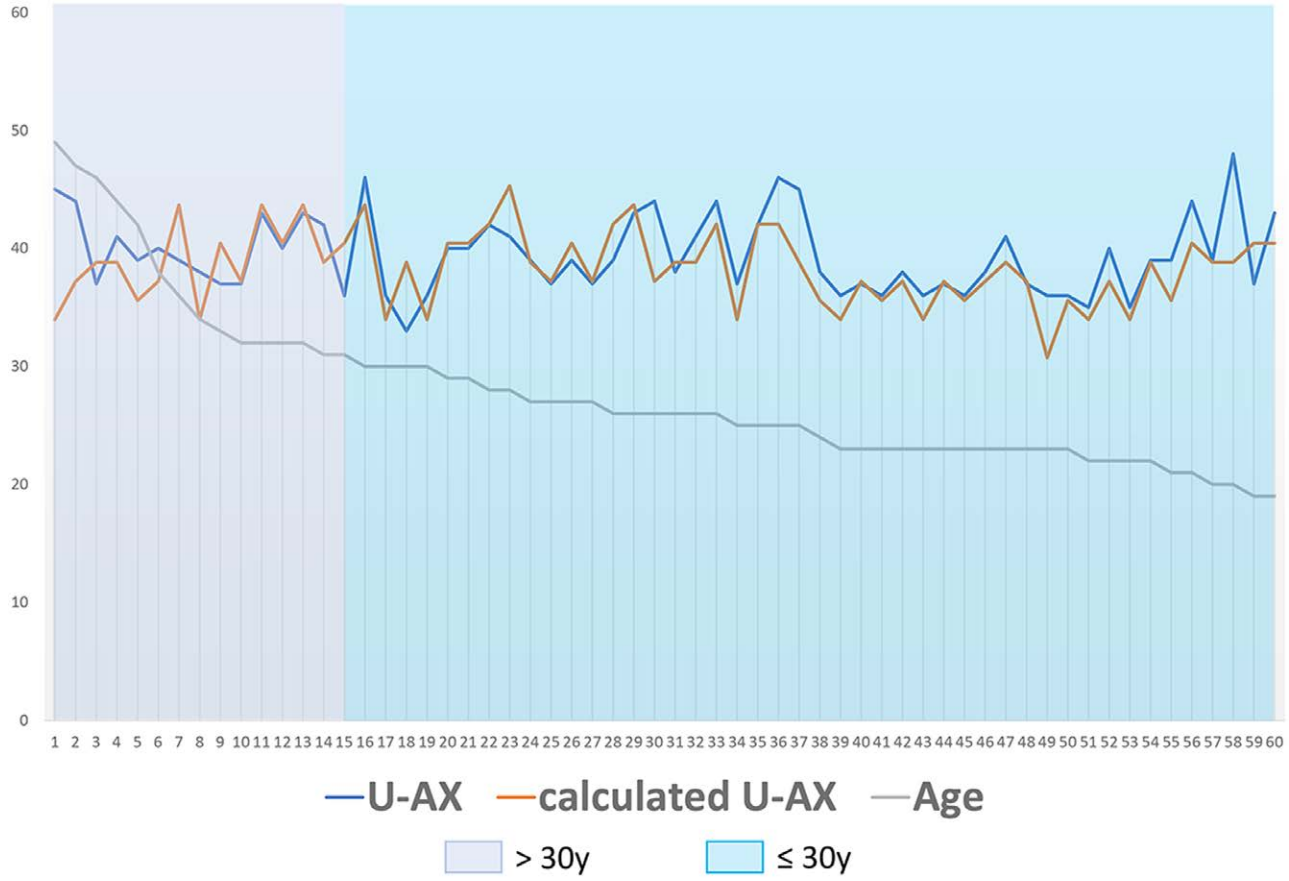

Fig. 4. Plot diagram of Age, U-AX, and calculated U-AX of all the volunteers in the study group.

the umbilicus-symphysis pubis; it exists instead with the U-ACr that defines the abdominal aesthetic unit's lower limit in women. This ratio was recently confirmed by an eye tracking and survey-based investigation.[13] A recent analysis of photographs of top male underwear models has suggested that the same ratio exists in male subjects as well.[23]

Unfortunately, most reports about ideal umbilicus placement are based on measurements made in women. Very few articles have compared male-to-female umbilicus position.[18,23,43,52] In young men, the abdomen has a more triangular shape with midline depression and well-defined paired rectus muscles. Laterally, it has a slight concavity extending to the flanks. In women, an hourglass appearance is most common. Despite some opinions to the contrary, men have a preference for a greater waist to hip ratio and lower navel location.[2,5,16,18,19,31,37,43,52,53] Moreover, rectus abdominis diastases are less common in men. Significant gender differences have also been described in anthropometric characteristics and in measurements between the umbilicus and fixed bony reference points.[30,37] Evidently, guidelines deduced from analysis of photographs that may have been edited of selected female models not representative of the general population[31,33] may not apply to men.

Undoubtedly, validity of measurements relies largely on ability to accurately and precisely identify various landmarks.[54] Serious doubts exist regarding accuracy of the determination of reference points such as the abdominal crease, symphysis pubis, and xiphoid on two-dimensional photographs. In a study conducted on female models, it was reported that pubic symphysis can be difficult to determine on images; the lower limit of the vulvar cleft was suggested instead as a more dependable landmark.[33] Exact xyphoid tip and symphysis pubis are particularly difficult to determine even by palpation in some overweight patients. Determination of these landmarks on photographs would certainly be highly inaccurate and derived ratios, and formulas would be likewise.

Confirming that some bony landmarks do not constitute reliable reference points, Visconti et al[17] reported that the xiphoid and the abdominal crease are best chosen as superior and inferior abdominal aesthetic limits and used for defining umbilicus positioning guidelines. However, despite recommendations that for clinical application, measurements should be obtained in a straight line, and not conforming to the three-dimensional abdominal anatomy, accurate intraoperative determination of abdominal crease during surgery is certainly not straightforward. Clinical practicality of the golden correlation of Visconti et al[17] is questionable. The suggestion to use the Fibonacci caliper intraoperatively is highly ingenious[55]; however, this may not be practical.

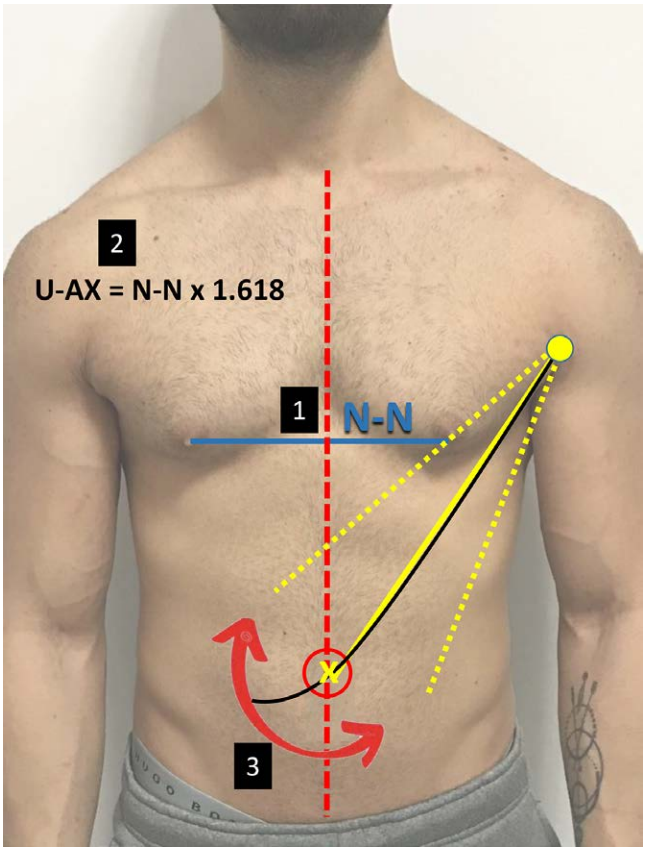

Fig. 5. Clinical simulation of ideal umbilical positioning that can be performed intraoperatively in the supine position. Step 1: measurement in the standing position of inter-nipple distance. Step 2: calculation of U-AX distance. Step 3: Intraoperative determination of umbilical position using a surgical thread or a measuring tape to transpose the calculated U-AX distance at the intersection with the midline.

We believe that in men, the upper aesthetic unit limit must be at the sternal notch, not the xiphisternum, and that intraoperative determination of U-AX and N-N can be made more readily than measuring U-ACr position. Unlike in women, optimal umbilicus and nipple positions seem to be aesthetically interrelated and function conjointly to enhance attractiveness of rejuvenated anterior male trunks when discordance is avoided.[20] Although beauty and attractiveness are based on biology rather than on mathematics, optimal form and function are mysteriously bound by a "universal" divine proportion.[56,57]

Most reported studies have focused on preoperative evaluation and surgical planning. Umbilical position alterations after surgery have not been well investigated. A short communication about a limited study has shown that with time the umbilicus becomes displaced cephalically.[58] Thus, efforts made intraoperatively for precise umbilicus reposition may be not very relevant because outcome stability is relative. As for midline placement, likelihood for reversion of umbilicus repositioning is high unless asymmetry and deep stalk position has been addressed by eccentric plication.[3]

As with most concepts of beauty and attractiveness, there is a spectrum of subjective opinions and personal preferences regarding optimal umbilicus relocation.[31] Arguing that there is no universal agreement, some surgeons allow their patients to make their own choices.[10] Similar to what has been described for vertical nipple level,[20] defining a range for pleasant umbilicus positioning is probably more constructive. Hoyos et al[7,8] have stressed that an ideal umbilicus zone would allow some freedom for preferred localization. By measuring male abdomens from xiphoid to pubis, this zone was defined by the overlapping area between the lower abdominal third and the upper three-quarters, without, however, any objective justification.

Lack of positive correlation of our equation with umbilicus position in older-aged cadavers is not really relevant because almost all patients seeking abdominal contouring look for abdominal rejuvenation irrespective of their chronologic age. As for BMI effect, we assume that abdomens with well-positioned umbilicus of young, fit, and healthy individuals would also be preferred by men with higher BMI.

Because determining normality is essential and averageness constitutes a key element in perception of human beauty,[59–61] the main strength of this study is that it has been conducted on regular volunteers in the standing position and on cadavers in the supine position, not on two-dimensional photographs of idealized models. Nevertheless, there are some limitations to the study related to manual measurements by several investigators and the limited precision in determining bony and surface reference points. Moreover, because standing position measurements and subsequent calculations were not tested to be the same in supine position, validity of transposing these measurements intraoperatively may be questioned. Obviously, their intraoperative validity, as described in the simulation in Figure 5 is needed. Furthermore, whether umbilicus position determined by N-N/U-AX is most aesthetic and would fit ideal male beauty needs to be investigated. Validity of the formula in the presence of various degrees of male gynecomastia will also need to be determined.

CONCLUSIONS

Of all the measured reference points in male volunteers, a constant golden number relationship could be identified only between N-N and U-AX. This relationship has already been clinically tested and reported for determination of nipple position.[17,59,61] Compared with the method described by Graham et al,[23] it is more predictive of the most appropriate umbilicus position. Measurement of N-N is also more practical and accurate than U-ACr. Unlike in women, male umbilicus-nipples relationship indicates that the anterior trunk aesthetic unit encompasses both abdomen and thorax and that nipples and umbilicus are the main visual aesthetic landmarks. This relationship must be respected to avoid unaesthetic discordance.

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DISCLOSURE

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