Skeletal And Postural Relation in Breast Hypertrophy And Following Its Reduction

***Wafaa Borhan, PT.D., *Maher A. El Keblawy, PT.D., **Dr. Salah Abdel Gany**
*Faculty of Physical Therapy, Cairo University
**Professor of Surgery, Faculty of Medicine, Cairo Univeristy

ABSTRACT

More than half of hypertrophic breast women presented with a physical complaint of back pain with changing the posture and lumbosacral angle. The aim of the present study is to investigate the changes of posture in breast hypertrophy and following its reduction. 40 female particepants had hypertrophic breast were conducted in the study, thier ages ranged between 16-20 years old. They were classified into two groups. The first group received postural exercises for 12 sittings. The second group received mammaplasty followed by postural exercises for 12 sittings, two weeks after operation. The results showed that, the lumbosacral angle in the first group before an exercises ranged 35-66 degrees with a mean value of 47.85 ± 8.18 degrees after exercises the angle range was 35-65 degrees with a mean value of 49.6 ± 8.36 degrees. The difference between the values ranged from 20.83% to zero % but in the second group, before exercises the angle range was between 35-65 degrees, with a mean value of 47.1 ± 8.28 degrees. After treatment the values range was 30-50 degrees with a mean value of 36.45 ±5.73 degrees. The difference was significant. The difference percentage ranged between 33.33% and 9.57%. The second gorup had improved 5 times in the mean angle more than the first group suggesting that hypertrophic breast reduction must be done before starting postural exercises.

INTRODUCTION

A mammary hypertrophy must be searched in women with a lumber pain and an surgical treatment may be proposed[9]. In the static spine the vast majority of painful states can be attributed to an increase in the lumbosacral angle with a consequent accentuation of the lumbar lordosis. The increase in the lumbar lordosis is commonly termed "sway back". It is a safe assumption to credit 75 per cent of all static or postural low back pains to such lordosis[21]. The first description of reduction mammaplasty dates back to the nineteenth century, when Durston[7] partially amputated a ptotic breast. Since then, several techniques have been developed[2,6,11,13,19,20,22].

Procedures in which large poritons of the gland were resected medially and superiorly risked interrupting the blood supply and innervation to the nipple-areola complex, as

well as leaving large dead spaces that produced hematomas or seromas. Techniques that had set patterns and nipple placement inhibited the surgeon's ability to make alterations during the procedure.

Other techniques required wide skin undermining, which essentially separated the gland from the skin. The skin acts like a pseudosuspensory ligament to the breast; and when the proportional separation of the "contents" from the "container" is too great, the embryologic continuity is disrupted. Consequently, these breasts often flattened superiorly and sagged inferiorly, and the nipple rotated upward instead of outward.

Pitanguy[25], from Sao Paulo, Brazil, developed a technique in which an almond-shaped piece of skin was resected through a subareolar incision. Although the principles were good, the shape was not always consistent. Nicholas et al.[23], presented a modification of this technique at the International Society of Plastic Surgeons Meeting in London. This modification extended the incision above the areola to the place where the new nipple would be naturally located (point A), at the level of the projection of the inframammary sulcus on the midclavicular line. The advantage was that it allowed for resection of tissue from the lower pole while gaining skin from the uppr pole. This afforded a nice shape to the breast while minimizing the scarring with one vertical incision. However, second and third degree hypertrophies required larger resections; and later that year, the classic Pitanguy reduction mamma-plasty was developed.

This proecedure evolved from point A of the Arie-Pitanguy technique and worked through a triangle, points A, B, and C, resulting in an inverted-T scar. The resection was located at the breast's lower pole, usually done in a shape similar to a ship's keel, its length being determined according to the deformity and pathologic condition to be corrected. It was perofrmed in a step-ladder fasion and preseved two columns of the breast tissue that, when reapproximated, moved the nipple-areola complex upward to its natural position while avoiding any dead space formation. Most importantly, there were no fixed patterns, and the attachment of the skin to the gland was maintained, allowing the breast to support ittself in a brassierc-like fashion.

According to Arie[1], Converse[4], Goldwyn[12], and Fauquest et al.[9], the ideal age of the patient is between 16 and 20 years. Virginal hypertrophy being the sole indication for surgery before the age of 16. There are no upper age limits, provided the potential benefits and medical risks of the surgery are equally considered.

Fauquent et al.[9], Han et al.[15], Gramfing and Elliott[14], suggested that more than half of hypertrophic breast patients presented with a physical complaint of back pain, anterior thoracic pain, or mastodynia. The weight of pendulous breasts produces changes in posture that can result in kyphosis with compensating lordosis and osteoarthrosis of the vertebral bodies (fig. 1).

During inspiration the muscles elevate the chest wall, raising the mammary glands by third degree leverage. The weight of the large ptotic breasts increases the effort of respiration during thoracic expansion. If this condition persists through the years, the patient may develop pulmonary problems that in turn may lead to emphysema and ultimately to cardiovascular problems. Large brassieres, necessary for support, may cut deep permanent grooves into the shoulders. In tropical climates and summer months, the moisture that collects

in the submammary sulcus often leads to intertrigo[2,9,15,26].

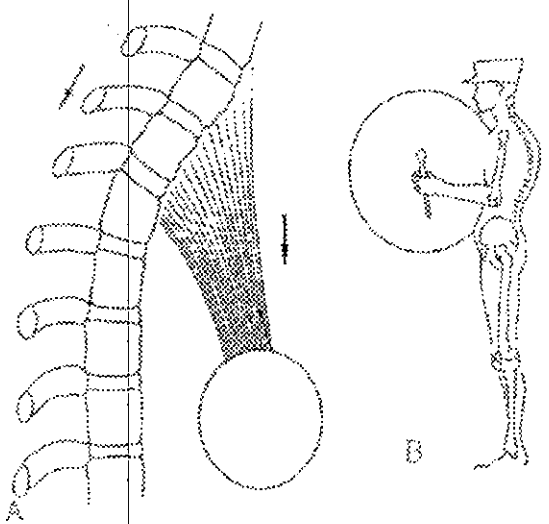

Fig. (1): A and B, the effects of pendulous breasts on the vertebral column are similar to the postural changes experienced by a bass drummer during a long parade. Coated from Fauquent et al.[9].

According to Burton[3], and Han et al.[15], the lumbosacral angle is formed when the horizontal base of the angle is parallel to the ground level and the hypotenuse of the angle is formed at the level of the superior border of the sacrum. The plane of the sacrum forms the base from which the lumbar spine takes off in its ascent and by which it achieves its balanced state[5].

Breast hypertrophy increase lumbar lordosis and change shearing stress, the shearing stress is proportional to the angle of the scaral inclination[17,18], (Table 1).

Table (1): The relation between lumbosacral angle and shearing stress.

LSA	Shearing Stress
30°	50%
40°	65%
50°	75%

The aim of the presnt study was to detect the changes of posture in breast hypertrophy and following its reduction.

MATERIAL AND METHODS

Fourty femal particepants had hypertrophic breast participated in the present study. There ages ranged between 16-20 years old, and were recruted from Kasr El Ani Hospital and Cairo Metropolitan areas. They were chosen under the following :

- Those who had no thoracic or lumbar sergury before the study.
- Non obese femal.
- No congenital anomalies in lumbosacral area.
- The hypertrophy of Breast was not related to malignancy.

They were classefid equally and randomly into two groups.

The first gorup (20 particepants) received postural exercises for lumbar and sacral areas, for 12 settings.

The second gorup (20 particepants) received reduction mammaplasty followed by postural exercises for the lumbar and sacral areas two weeks after operation for12 settings.

Methods

Evaluation :

Anthrompometric measurement were done including, weight, height, to exclude obese subjects.

Plan radiographs from lateral views were done to detect the lumbosacral angle.

- First evaluation was done before treatment.
- Second evaluation was done after 12 settings.

Exercise program :

The first group was treated with postural exercises included :

Strengthining exercises for

1. Upper back muscles rhomboids, trapizuis, erectrospinae, latissmus dorsi muscles to treat kyphotic curve in dorsal spine,
2. Abdominal muscles rectus abdominus; external and internal obliques, transversus abdominis muscles, and
3. Pelvic muscles, gluteus maximus, and hamstring muscles.

Stretching exercises for the muscles in the concave side of the spine.

The exercise program was done every sitting for 20 minuts followed by postural adjustment, and gait training in front of mirror. The patients were adviced to repeat the program of exercises for 30 minuts every day. They were adviced to prevent bad posture and wearing high heel during activities of daily living.

The second group received 12 sittings with the same previous program, two weeks after operation (whatever the type of technique used in mammaplasty).

RESULTS

Table (2) shows, the lumbosacral angle, the difference and the difference percentage before and after postural exercise only. Before exercise, the angles ranged 35-66 degrees, with a mean value of 47.85 ± 8.18 degree. After exercise, the angle ranged 35-65 degrees, with a mean value of 49.6 ± 8.36 degrees (Fig., 2). The difference between the values before and after exercise was significantly different (t paired = 3.9428, $P<0.001$). The difference between the values of the angle before and after exercise ranged from 10 to zero degree, which corresponds to a difference percentage from the values before which ranged from -20.83 % to zero % (Fig., 3).

Table (3) shows, the lumbosacral angle, the difference and the difference percentage before and after postural mammaplasty plus postural exercise. Before exercise, the angles ranged between 35-65degrees, with a mean value of 47.1 ± 8.28 degrees. After mammaplasty and exercise, the values of the angle ranged between 30-50 degrees, with a mean value of 36.45 ± 5.73 degrees, the differences between these values are significant (t paired = 10.3218, $P<0.001$). The difference between the values of the angle before and after mammaplasty plus exercise ranged from -22 to -3 degrees, which corresponds to difference percentage from the values before which ranged from -33.33 % to -9.57 % (fig. 3).

Comparing the mean values of the lumbosacral angles before exercise (group I) and before mammaplasty plus exercise showed no significant difference (unpaired $t = 0.2882$, $P>0.3$).

These results show that in the two groups of subjects in whom the lumbosacral angles were comparable, postural exercise alone significantly reduced the angle, but the mean

reduction was -2.25 (about 4.7 %), while mammaplasty plus postural exercise have reduced the lumbosacral angle, aslo, significantly, and the mean reduction was -10.65 degrees (about 22.6 %), i.e. about 5 times the reduction in the mean angle produced by postural exercise only.

Table (2) : Lumbosacral angle, the difference and difference percentage before and after postural exercise only in the first group.

No.	Before exercise	After exercise	Difference	Difference %
1	40	38	-2	5.0
2	45	45	0.0	0.0
3	36	35	-1	2.78
4	48	46	-2	4.17
5	50	50	0.0	0.00
6	66	65	-1	1.52
7	35	35	0.0	0.0
8	47	45	-2	4.26
9	38	35	-3	7.89
10	55	55	0.0	0.00
11	48	47	-1	2.08
12	56	55	-1	1.79
13	47	44	-3	6.38
14	48	38	-10	20.83
15	50	45	-5	10.0
16	60	55	-5	9.33
17	45	39	-6	13.3
18	46	46	0.0	0.0
19	58	56	-2	3.45
20	39	38	-1	2.63
Mean	47.85	49.60	- 2.25	4.77
± S.D	8.18	8.36	2.55	5.34
t paired		3.9428		
P		<0.001		

Table (3) : Lumbosacral angle , the difference and difference percentage before and after mammaplasty plus postural exercise in the second group .

No.	Before exercise	After exercise	Difference	Difference %
1	60	50	-10	16.7
2	53	43	-10	18.87
3	40	32	-8	25.0
4	46	32	-14	30.43
5	55	43	-12	21.82
6	42	31	-11	26.19
7	38	32	-6	15.79
8	65	43	-22	33.85
9	52	38	-14	26.92
10	37	30	-7	18.92
11	48	32	-16	33.33
12	50	38	-12	24.00
13	42	31	-11	26.19
14	45	38	-7	15.56
15	47	32	-15	31.91
16	35	32	-3	9.57
17	58	42	-16	27.59
18	36	31	-5	13.89
19	45	38	-7	15.56
20	48	41	-7	14.58
Mean	47.10	36.45	-10.65	22.33
± S.D	8.28	5.73	4.61	7.19
t paired		10.3218		
P		<0.001		
Significance		*		
t un-paired	0.2882		7.1241	8.7648
P	>0.3		<0.001	<0.001
Significance	N.S		*	*

t paired compares the before with the after values.
t unpaired compares values with exercise only and those with mammaplasty plus exercise .
* = significant. N.S = Non significant.

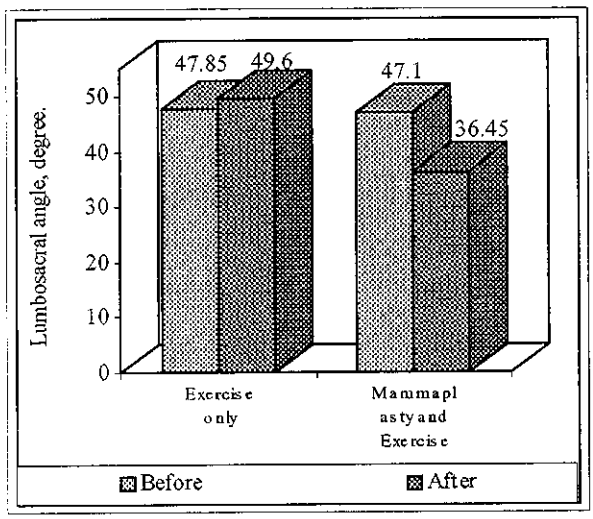

Fig. (2) : Mean lumbosacral angle before and after postural exercise only or after mammaplasty followed by postural exercise.

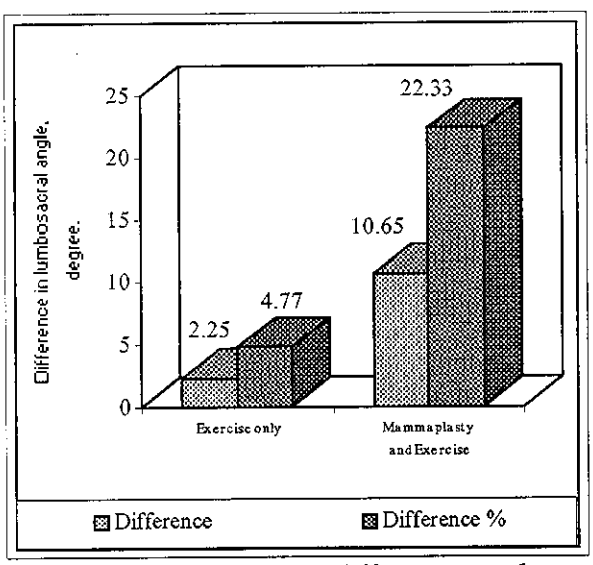

Fig. (3) : The mean difference and mean difference % in lumbosacral angle before and after postural exercise only or after mammaplasty followed by postural exercise.

DISCUSSION

Maihaffer and Echternach[21], noticed that in the static spine the vast majority of painful sates can be attributed to an increase in the lumbosacral angle with a consequent accentuatation of the lumbar lordosis. This result was confirmed by Dillard et al.[5], and Han et al.[15].

Ohlen et al.[24], and Burton[3], suggested that the shearing stress is proportional to the angle of the sacral inclination. Edeiken et al.[8], and Kelso et al.[16], proposed that an exaggerated lumbar lordosis followed hypertrophic breast lead to increases anterior shear stress at the lumbasacral angle and causes postural back strain, with mechanical default followed by a muscle spasm and/or fascial restrection. In the present study regulation of lumbar and pelvic posture changed the shearing stress with subsequent change in lumbosacral angle.

According to Gill, et al.[10], Nicholas et al.[23], and Burton[3], in hypertrophic breast, the weight of pendulous breast produces changes in posture that can result in kyphoses with compensating lordosis and osteoarthrosis of vertebral bodies followed increasing of the lumbosacrol angle.

The LSA changes more in gorup two. The changes after applicaiton of mammaplasty were more than that followed postural exercises only. This result may be due to the effect of relaxation of the superficial as well as deep muscles in lumbosacral areas following the operation and decreasing of the weight and mechanical stresses on the dorsal and lumbar spine[3,10].

According to Fauquent et al.[9], and Han et al.[15], the kyphotic primary curve in the dorsal spine which followed by secondary lordotic curve in the lumbar spine, which change the LSA, disappear after treating the orginal cause (hypertrophic breast).

This leads to normalise the LSA as shown in group two more than group one.

In conclusion postural exercises only is not effective in the treatment of postural defect and low back pain in hypertrophic preast women. This result may be due to the effect of superficial and deep muscles in lumbosacral areas followed decreasing the mechanical stresses, from hypertrophic breast after the operation. The idial treatment is to perform mammaplasty reduction as early as possible before starting of postural exercises.

REFERENCES

1- Arie, G. : Una nueva tecnica de mastoplastia. Rev. Latinoam. Cir. Plast. 3:23, 1957.
2- Biesenberger, H. : Deformitaten und kosmetische Operationen der weiblichen Brust. Vienna, Maudrich, 1931.
3- Burton A.K. : Reliability and validity of four instruments for measuring lumbar spine and pelvic positions. Phys. Ther. 66:677-685, 1986.
4- Converse, J. M.:Reconstructive Plastic Surgery. Philadelphia, W.B. Saunders, 1964.
5- Dillard J., Trafimow J., Andersson G.B.: Motion of the lumbar spine, reliability of surement techniques. Spine 16:321, 1991.
6- Dufourmentel, C. : Chirurgie Reparatrice et Correctrice des Formes. Paris, Masson, 1939.
7- Durston, W. : Sudden and excessive swelling of a woman's breast. Phil. Trans. Roy. Soc. 4th ed. London, 1869.
8- Edeiken, J., Wallace, J.D., Curley R.F., et al. : Thermography and herniated lumbar disc. Am. J. Roent Radiol. Ther. Nuel Med. 102:790-796, 1968.
9- Fauquent B., Goupille P., Rauif M.: Rouif V., Mateu J. and Valat J.P.: Breast hypertrophy and dorsolumbar spine, prognostic influences of Lumbar lordosis; preliminary results. Rev. Rhum. Mal. Osteoartic. Jun.; 58(6):435-1, 1991.
10- Gill K., Krag, M.I.I., Johnson G.B., Haugh L.D., Pope M.H. : Repeatability of four clinical methods for assessment of lumbar spinal motion. Spine, 13:50-53, 1988.
11- Gillies, H., McIndoe, A. H. : The technique of mammaplasty in conditions of hypertrophy of the breast. Surg. Gynecol. Obstet. 68:658, 1939.
12- Goldwyn, R.M. : Plastic and Reconstructive Surgery of the Breast. Boston, Little Brown, 1976.
13- Guinard, M. : Comment on: Rapport de l'ablation esthetique des tumeurs du sein par M. H. Morestin. Bull. Mem. Soc. Chir. Paris 29:568, 1903.
14- Gramfing, S. and Elliott: Efficient pain assessment in clinical settings. Behav. Res. Ther., Jan. 30(1):71-3, 1992.
15- Han, J., Ahy, J., Coel V. and McGoman V. : CT-based geometric data of Human spine. J. spinal-disored. Dec. 5(4):448-58, 1992.
16- Kelso A.F., Grant R.G., Johnston W.L. : Use of thermograms to support assessment of somatic dysfunction or effects of osteopathic manipulative treatment: Preliminary report. J. Am. Osteopath. Assoc. 82:182-188, 1982.
17- Koor I.M., Thomas P.E., Wright H.M. : Patterns of electrical skin resistance in man. Acta neuroveget., Bd XVII Weign 17:77-96, 1958.
18- Koor I.M., Wright H.M., Thomas P.F.,: Effects of experimental myofascial insults on cutaneous patterns of sympathetic activity in man. Acta Neuroveget. Bd XXIII, Weign 23:329-355, 1962.
19- Kraske, M. : Die operation der atrophischen und hypertrophischen Hangebrust. Munch. Med. Wochenschr. 70:672, 1921.
20- Lexer, E. : Hypertrophie bei der Mammae. Munch. Med. Wochenschr. 59:2702, 1912.
21- Maihaffer G.C., and Echternach J.L. : Reliability of a method of measuring backward bending of the thoracolumbar spine. J. Orthop. Sports Phys. Ther. 8:574-577, 1987.
22- Morestin, H.: Hypertrophie mammaire traitee par la resection discoide. Bull. Mem. Soc. Chir. Paris 33:649, 1907.
23- Nicholas G.; Greqgory S. and Ronald R.: Principles of reduction mammaplasty. Textbook. Aesthetic surgery of the breast, London, W.B. Saunders Company, 16:189-195, 1990.
24- Ohlen, G., Spragfort F., and Tingvall, C. : Measurement of spinal sagittal configuration and mobility with DeBrunner's kyphometer. Spine 14:580-583, 1989.
25- Pitanguy, I. : Surgical treatment of breast hypertrophy. Br. J. Plast. Surg. 20:78, 1967.
26- Pitanguy, I. : Hipertroofias mamarias. Cuad. Hosp. Clin. Bolivia, p. 14, 1969.

الملخص العربي

العلاقة الهيكلية للقوامية عند تضخم الثدى وعقب إنقاصه

يتحرك الثدى المتضخم كالبندول ويؤدى إلى تغير فى القوام وانحناء أمامى فى العمود الفقرى مع انحناء جانبى تعويضى والنهايات مفصلية عظمية فى جسم العمود الفقرى والدراسة الحالية تبحث فى تغير القوام فى حالات تضخم الثدى قبل وبعد تصغيره. شملت الدراسة أربعون أنثى تراوحت أعمارهن بين ١٦، ٢٠ عاما حيث تم تقسيمهم بالتساوى وعشوائيا إلى مجموعتين، المجموعة الأولى تم علاجها بعمل تمارين القوام لعضلات الظهر والبطن والحوض لمدة أثنا عشرة جلسة. والمجموعة الثانية تم عمل تمارين القوام لها وبعد اسبوعان من جراحة تصغير الصدر. وقد تم عمل أشعة جانبية لتحديد الزاوية القطنية العجزية قبل وبعد العلاج. وجاء النتائج أن الزاوية القطنية العجزية فى المجموعة الأولى تراوحت بين ٣٥ – ٦٦ درجة ومتوسط ٨,١٨ ± ٤٧,٨٥ درجة وبعد العلاج تراوحت الزاوية بين ٣٥، ٦٥ بمتوسط ٨,٣٦ ± ٤٩,٦ درجة وكان الفرق متراوح بين ٢٠,٨٣٪ إلى صفر٪ . ولكن فى المجموعة الثانية كانت الزاوية قبل العلاج بين ٣٥ – ٦٥ بمتوسط قدره ٨,٢٨ ± ٤٧,١ درجة. وبعد العلاج أصبحت الزاوية بين ٣٠ – ٥٠ بمتوسط ٣٦,٤٥ ± ٥,٧٣ .وكان الفرق إيجابيا والفرق المئوى من ٣٣,٣٣٪ إلى ٩,٥٧٪ . وقد تحسنت المجموعة الثانية بدرجة تفوق المجموعة الأولى خمسة مرات . وقد خلصت الدراسة إلى ضرورة عمل جراحة تصغير الصدر قبل بدء تمارين القوام وذلك لاستعادة الزاوية القطنية العجزية لطبيعتها والتغلب على تشوهات وآلام الظهر.