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Quantitative Breast Volume Measurement by Anthropometry Aiding Decision Making in Gyneocmastia Surgery

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Abstract: Gynecomastia is emerging as a commonest male breast condition in the present world. Inspite of being benign it deals a huge physiological embarrassment to the patient and social disconnection in family or peer groups. Most common presentation is idiopathic. Traditionally in the barbaric era crude excision used to be the treatment of choice which is highly unacceptable in the present aesthetic oriented society. In the course of evolution, it changed from crude excision to minimal or small incision approach to liposuction to meet realistic expectations of a young adult. Surgical approach is centered on the constituents of gynecomastia i.e. amount of fat and gland volume which is appreciated clinically as mild, moderate or severe but unfortunately there is no way to quantify them absolutely . We conducted a study on 34 patients (49 breasts) using Anthropometric method to quantify the breast fat volume to decide the appropriate surgical technique pre-operatively inspite of deciding it intra-operatively on table. Patients were divided into two groups (group I- liposuction plus excision & group II- liposuction). Group I has 16 breasts and Group II has 33 breasts. We found statistically significant difference (p value <0.5) between anthropometrically calculated breast fat volume in two groups. We recommend a classification based on breast fat volume and procedure required to be used for better preoperative counselling to accept the potential postoperative scarring.
Keywords: Gynecomastia, Anthropometry, Excision, Breast Fat Volume.

INTRODUCTION

Gynecomastia is the most common condition of the male breast. It is defined as benign enlargement of the male breast [1, 2, 4]. It has trimodal distribution with peaks in neonates, adults, and senile age group [6-9]. Most of the cases are idiopathic in nature. The common reasons for which patient request treatment are psychosocial issues followed by tenderness. A number of classifications have been proposed based on the constituents, size of breast, and amount of the resectable tissue and so on. Assessment and diagnosis of gynecomastia is essentially clinical, although various methods have been used for quantification of breast volume in order to guide the surgeon in choosing the appropriate procedure. These methods are mammography, ultrasound, anthropometry Grossman-Roudner device and Archimedes principle. The treatment ranges from conservative medical management to surgical excision of the gynecomastia as dictated by volume of breast and the tissue involved [12].In this study we have done preoperative anthropometric breast volume assessement and tested its utility in predicting the operative procedure for gynaecomastia.

MATERIALS AND METHODS

This is a cross-sectional study on gynecomastia patient reporting to the department of burns and plastic surgery, PGIMER, Dr.RML hospital, New Delhi from November 2014 to April 2016.

Study Design: Cross-sectional Study

Setting

Department of Burns and Plastic surgery, PGIMER and Dr.RML hospital, New Delhi

Duration: 18 months

Study Frame

All consecutive patients of gynecomastia patients who were eligible for the study and willing to participate in the study

Sample size: 34 patients of gynecomastia

Inclusion criteria

All patients of idiopathic gynecomastia whether unilateral or bilateral presenting to PGIMER Dr.RML hospital, Delhi during a period from Nov 2014 to Apr 2016.

Exclusion criteria

- Gynaecomastia secondary to any disease like chronic liver disease, testicular failure, hypogonadism, thyroid disorders etc.
- Pubertal gynaecomastia (13 to 16yrs)
- Drug induced gynaecomastia.

Method

Anthropometric method to calculate breast volume-

V (in cc) = $\frac{\pi}{3}$MP2x(MR + LR + IR − MP)

=1/3x 3.14x MP^2x (MR+LR+IR-MP)

MP- mammary projection
LR - lateral radius (breast mound to mid-axillary line)
IR- inferior radius (breast mound to inframammary fold)
MR- medial radius (lateral border of sternum to breast mound)

Volume of fat will be calculated by subtracting the gland volume from total breast volume.

ANALYSIS

Analysis of data was conducted using SPSS ver. 17.0 (SPSS Inc., Chicago, IL, USA). All continuous variables were presented as mean ± standard deviation, and the frequencies of categorical variables were presented as percentages. Continuous variables were analyzed with the independent t-test when there were normal distributions and with Mann-Whitney U-test when there were no normal distributions. Categorical variables were analyzed with the chi-square test. Diagnostic characteristics of fat and gland in gynecomastia were assessed by receiver operating characteristic (ROC) curve analysis. The area under the curve (AUC) of the ROC plot ranges from 1.0 (perfect separation of test values into two groups) to 0.5 (no distributional difference). An AUC > 0.7 indicates a discriminating strength of statistical significances; an AUC > 0.8indicates excellent discriminating power for the test. Cut-off value of each biomarker was defined by Youden's index. A P-value under 0.05 is considered statistically significant.

RESULTS

Simon's classification was followed in the study and all patients were in grade I & II.

Forty nine breasts of 34 patients of gynecomastia were divided into two groups according to the type of treatment given.

Group I= 16 Liposuction followed by excision.
Group II=33 Liposuction.

Median breast volume in Group I – 346cc
Median breast volume in Group II- 219cc

Difference in breast volume between two groups is statistically highly significant with p value = 0.000

On plotting ROC curve, Cut off value of 249.63cc has sensitivity & specificity of 68.8% & 69.7% respectively

Positive predictive value - 52.38
Negative predictive value - 82.14

As the breast volume increases, possibility of excision increases, hence if breast volume is above a particular value it can predict excision. But if it lesser than that volume, can effectively rule out the excision i.e. better negative predictive value.

Overall complication rate was 18% (9) out of 49 breasts.

Group I – 7 (14%)
Group II – 2 (4%)

All were minor complications with one patient required hematoma evacuation in theatre.

Wound dehiscence healed without any obvious disfiguration.

Two patients required fat grafting to correct saucer deformity.

Figures

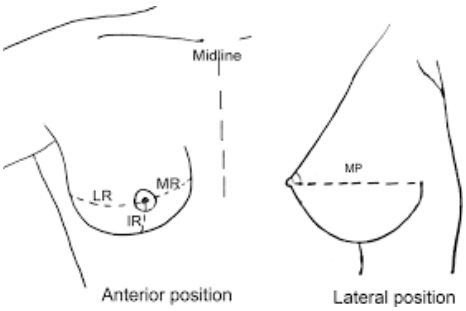

Fig-2:

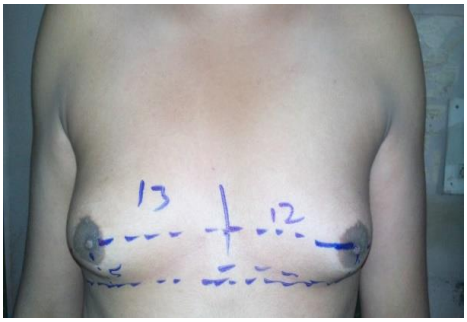

Fig-3: Preoperative calculation of gland volume

Fig-4: Postoperative case 4

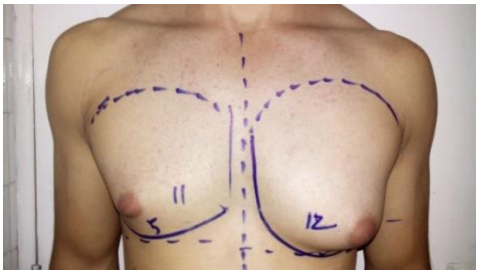

Fig-5: Preoperative case 5

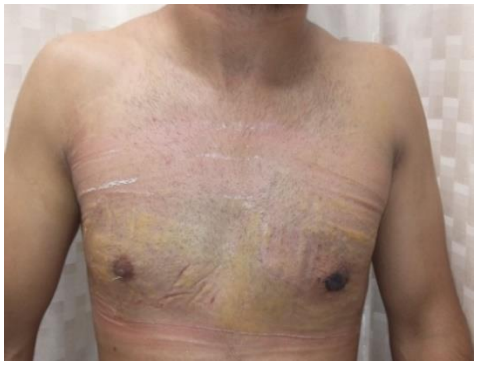

Fig-6: Postoperative case 5

Group distribution

Table-1: Number of breast in each treatment group

	group I	group II
number of breast	16	33

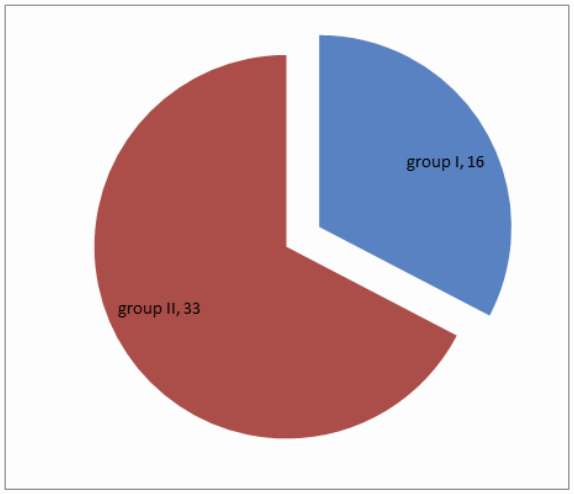

Fig-7: Number of breast in each treatment group

Table-4: Breast fat volume in two groups

	Group I	Group II
Breast volume	346cc	219cc

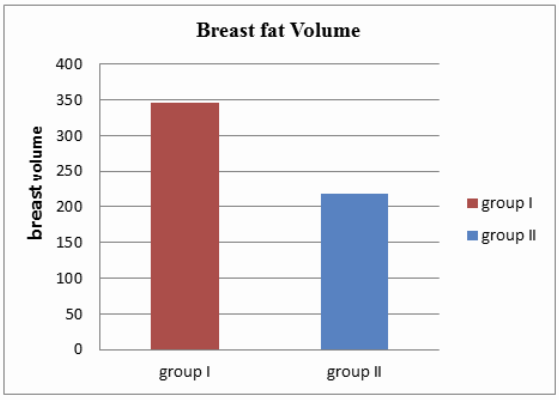

Fig-8: Breast fat volume in two groups

Table-4: ROC: Breast fat volume

	CutOff	AUC	Sensitivity	Specificity
Breast Fat Volume	249.63	81.30%	68.8	69.7

ROC Breast Fat volume

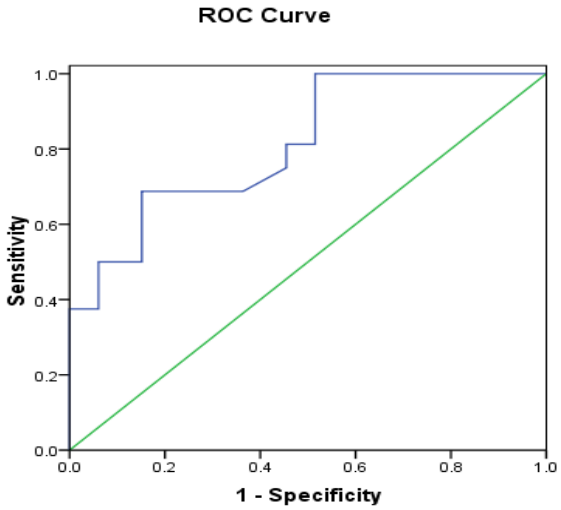

Fig-9: ROC curve

DISCUSSION

Gynecomastia in itself is a benign condition but it's a nightmare for an adult in present day world which keeps him distressed and shy all the time with social disconnection. In our study, 49 breasts (from 34 patients) were divided into two groups according to the treatment received. All the patients in our study were Simon's grade 1 and grade 2.

Group 1 consists of breast treated with liposuction followed by excision.
Group 2 consists of breast treated with liposuction.

All the patients were evaluated by history, clinical examination, hormonal study, routine blood investigations and ultrasound of breast.

Out of 34 patients, 15 were presented bilateral gynecomastia while 19 with unilateral gynecomastia as shown. It is in accordance with other studies [6-9].

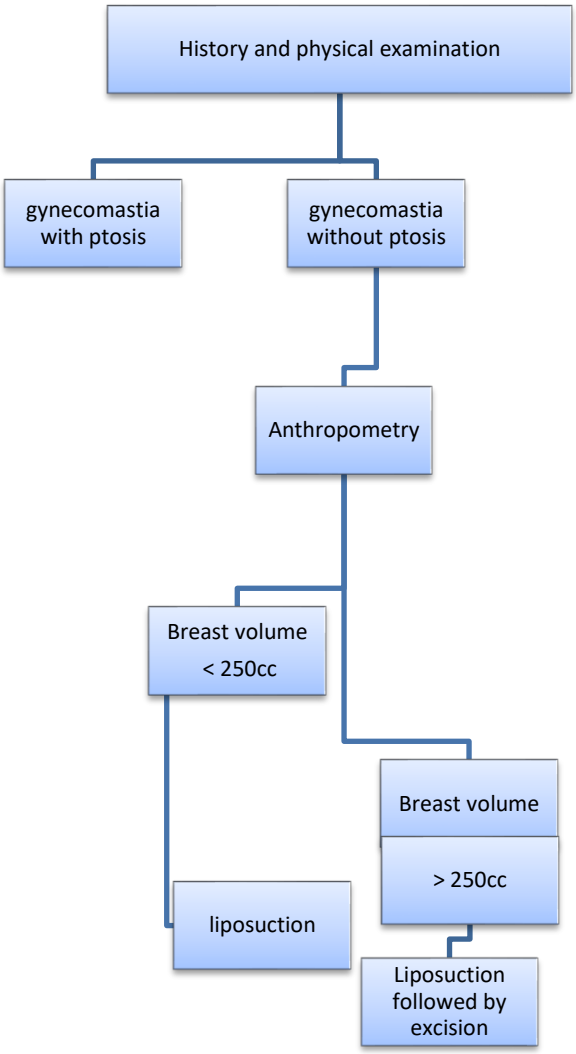

Fig-10

The main goal of treating this condition is to remove the excess breast tissue achieving the best symmetry with minimal scarring. Traditionally excision used to be the treatment of choice which has changed to minimal invasive approach in today's scenario. Liposuction in the present time is one of the revolutionary equipment used. Current protocol of gynecomastia in lower grades is to start with liposuction and assessment of breast after finishing liposuction; if any residual lump felt then excision done. So there is always an uncertainty in preoperative planning and deciding the right modality which is only possible on table per- operatively. Since it is the proportion of fat volume and gland volume that decide the procedure required there should be some objective measure of its quantification. A number of studies are available about the excisional and liposuction techniques but very little written about the quantitative estimation of fat and gland volume. Breast volume has been used empirically to grade them into mild, moderate and severe but there has been no attempt to develop any grading system based on numerical values of breast volume [54].

It is difficult on physical examination to differentiate the fibroglandular tissue with adipose tissue in dense breast in grade 1 and 2. It seems logical that if we have qualitative and quantitative estimation of different constituent we can have better preoperative planning and accordingly counselling regarding the procedure. It is now well accepted that low grades of gynecomastia are best treated with liposuction alone and combination of liposuction and surgical excision is best suited for the mixed nature of the breast tissue (fat and glandular or fibrous components).

In literature multiple methods are available to determine the volume of breast including[55-60].

- Anatomic (anthropometric)
- Thermoplastic casting
- The Archimedes procedure
- Grossman-Roudner device
- Mammography

Out of all the methods available, mammography is the most accurate method but it requires an additional investigation. Anthropometric measurement of breast volume is most comfortable, feasible, and less expensive with acceptable degree of accuracy [28,61].In our study, Breast volume obtained by anthropometry [28, 61]was different in two groups i.e.

Group I - 346cc and Group II- 219cc with p value = .000 which is highly significant statistically. This signifies as the volume of breast increased, chances of excision increased. This has been reported in other studies too as the grade of gynecomastia increases, possibility of excision increases.

On ROC, at Cut off value of 249.63cc of breast volume, sensitivity/specificity for excision is 68.8% / 69.7% respectively.

The numerical data of breast volume obtained from this study along with a cut off value can used objectively to decide preoperatively the operative modality to be used. The existing grading systems can be improved by using numerical values of breast volume instead of subjective terms like mild, moderate severe. Such objective grading system can be of functional value guiding the surgeons to appropriate surgical modality.

CONCLUSION

Quantitative Breast volume assessment by Anthropometry method in gynecomastia is easy to perform, reproducible, less expensive and with acceptable level of accuracy. It can be used to select appropriate surgical modality preoperatively and can be used for better preoperative counselling. We recommend a classification based on amount of breast fat volume to aid in clinical judgment.

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