# Breast Envelope Expansion in Augmentation Mammoplasty: Comparative Data Analysis in Submuscular and Subglandular Planes.

*Umar Daraz Khan

**Abstract:**

**Aim:** Longevity and aesthetic outcome of augmentation mammoplasty partly depends on breast envelope stability. Changes in breast envelope, on the other hand, are dynamic and depends on the pocket selection. A retrospective data analysis was done to establish the effects of interaction between implant and its pocket on breast envelope.

**Methods:** Augmentation mammoplasty using an inframammary crease incision was selected and retrospective data of augmentation mammoplasty was retrieved. Each breast was treated as a single unit and data of 2,000 augmented breasts was analysed. Data of preoperative nipple to the marked incision on stretched skin and six months postoperative nipple to neo IMC measurements changes were analysed when implants were placed in partial submuscular and subglandular plane.

**Results:** With a similar mean preoperative marked incision in a stretched skin, postoperative results in partial submuscular pocket showed less lower pole expansion as compared to subglandular plane.

Conclusion: Skin envelope in a submuscular plane, is supported better when pectoralis enforces posterior wall of the breast envelope.

is a need of mass awareness and social support of T.B sufferers; and sympathetic attitude of Health Care Providers.

**Key Words:** Breast morphometry, Submuscular Biplane Augmentation, Breast Envelope Dynamics.

## Introduction:

Breast envelope is a dynamic structure and responds differently when an implant is placed in subglandular or submuscular plane. An augmented breast envelope in a submuscular plane is stable and supported better. Muscle acts as a support mechanism for the implant and resist recurrent ptosis.[1] Similar observation is made in literature that an implant is supported better in a submuscular plane.[2] Anatomically breast gland lies in a prepectoral plane extending from 2nd to 6th ribs, from this fixed anatomical extent, breast depends in a shape that varies in almost every individual.[3] The consistency of breast varies from person to person and changes in an individual from time to time.[4,5] This anatomical prepectoral position of the breast was the reason of first mammoplasty in subglandular plane.[6] The aim was to give a natural three-dimensional enhancement with the nipple areolar complex located at the most projected part of the breast. However, the high incidence of capsular contracture in this plane led to a total submuscular pocket.[7] Lack of adequate breast projection and aggressive dissection was soon realised and partial submuscular pocket[8] was introduced as a compromise between the two. The search for an ideal implant pocket has not stopped since than and dual plane[4] subfascial[9] and muscle splitting biplane[5] are some of the new pockets described, each targeting an ideal result.

## Material and Methods:

Retrospective computer data of augmentation mammoplasty was retrieved. Augmentation mammoplasty using an inframammary crease incision was selected for the study and data of 2,000 augmented breasts was analysed, each breast acting as an individual unit. All had textured, soft cohesive gel silicon implants. The mean age of the 1,000 patients was 31.2 years with a standard deviation of 8.2 (range 18-67). Mean size of the implant used was 313cc with a standard deviation of 40.95 (range 200-555 cc). The adequacy of soft tissue cover was assessed, using pinch test, superior and medial to nipple areolar complex and a decision was made for the prosthesis plane of dissection when subglandular or partial submuscular plane was considered.

### Procedure:

Preoperatively, an incision was marked in standing position on a stretched skin (Fig 1). For a round and high profile implant size of 300 or 350 cc with the base diameter of 11.2 & 11.9 cm, an incision is marked at 7-7.5 cm respectively; for a 260 cc implant with a base diameter of 11cm, an incision is marked at 7 cm; and for 400 and 440 cc implant with a base diameter of 12.1 and 12.7 cm, an incision is marked at 7.5-8 cm below the nipple respectively. For other sizes and profiles of the implant appropriate adjustments were made. In patients with an IMC to nipple measurement

1. Consultant Plastic Surgeon, Belvedere Private Hospital, Knee Hill Abbeywood

.=corresponding author :

Email: mrumarkhan@aol.com

of 8 cm or greater, incision was placed in the existing crease.

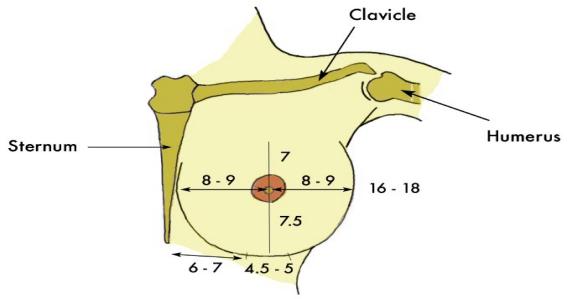


**Fig 1 :** Average markings for a breast augmentations for 300-350 cc implants when inframammary incision is used.

All procedures were performed in supine position under general anaesthetic with arms abducted and supported at an angle less than $90^0$. A 4.5-5 cm curvilinear incision, 6.5-7.5 cm lateral to midline, is made down to subdermal level (Fig2). Initial dissection is done in an upward and oblique direction by opening and closing blades of McIndoe scissors down to the pectoralis fascia. Further dissection depends on the pocket used for implant placement. Infero-medial fibres of the Pectoralis Major are released when implants are placed in the partial submuscular plane[8] and in subglandular pocket,[6] sharp dissection is carried out using electrocautery on cutting mode.

Once the pocket dissection is completed, ballooning manoeuvre is performed to check the pocket dimension.[10] Prosthesis is placed aseptically and closure is done in two .

**Fig 2 :** Inframammary incision is marked on a stretched skin, using a measuring tape, in a standing position.

deep layers without drains: pectoralis fascia and subcutaneous tissue is closed using continuous 3-0 vicryl and subdermal layer is closed using interrupted 4-0 vicryl. Skin approximation was achieved using steristrips and small adhesive dressings are applied and support bra is applied before patients are transferred to recovery. The measurement of the nipple and neo IMC is done at six months postoperatively.

Results and Statistical Analysis:

Available data of two pockets measurement from nipple to marked incision and six months postoperative measurement of the same parameters was collected and analysed. Mean inframammary incision was marked at 7.6cm (± 0.9). Mean six months postoperative nipple to IMC distance was 8.7cm (±1) (Table 1).

**Table1 -** Over all pre and postoperative data of measurements taken from nipple to inframammary crease in breast augmentations performed through inframammary crease.

| | n | Mean (cm) | Median (cm) | Range (cm) |
|---|---|---|---|---|
| Marked incision | 1836 | 7.6 ± 0.9 | 8 | 5 - 14 |
| Six months postoperative nipple to IMC measurements | 1146 | 8.7 ± 1 | 9 | 6 - 14 |

Preoperative measurements from nipple to marked incision and six months postoperative changes from nipple to neo IMC were also measured in two different pockets of dissection. The collected data obtained in these two pockets was analysed separately to evaluate lower pole expansion. With an incision marked at 7.3cm (±1.1) and six months postoperative measurement of 8.1cm (±1) partial submuscular pocket showed least lower pole expansion. With mean incision marked at 7.6 ± 0.9 and mean six months postoperative value of 8.8 ± 0.9, subglandular pocket reflected more expansion of skin envelope in the lower pole of breast. (Tables 2 &3).

**Table 2 -** Preoperative and postoperative measurements in submuscular and subglandular planes taken breast augmentation respectively (in cm).

| Plane of pocket | Nipple to marked infra-mammary Incision(cm) Mean ± sd | Six months post operative nipple to inframammary distance(cm) Mean ± sd |
|---|---|---|
| Partial submuscular | 7.3 ± 1.1 (n = 208) | 8.1 ± 1 (n = 116) |
| Subglandular | 7.6 ± 0.9 (n = 1360) | 8.8 ± 0.9 (n = 700) |

**Table 3 -** Statistical analysis of expansion of breast lower pole (nipple to marked inframammary incision compared to six months postoperative measurement of nipple to inframammary crease)

| Pocket of dissection | Incision marked (cm) | Postoperative distance (cm) | Difference in cm (Post op - pre op) | P Value |
|---|---|---|---|---|
| Submuscular | 7.3 ± 1.1 ( n = 208) | 8.1 ± 1 ( n = 108) | 0.8 | <0.001 |
| Subglandular | 7.6 ± 0.9 ( n =1360) | 8.8 ± 0.9 ( n = 700) | 1.2 | <0.001 |

Preoperative and postoperative data of each subset, based on the pocket used, was compared. Statistical analysis, using student t-test, showed a significant difference between marked preoperative incision and four months postoperative neo-IMC measurements (Table 3).

The effect of the weight on the lower pole skin envelope expansion was studied and compared in patients on the basis of the size of the prosthesis used. High profile implant of 260cc and 350cc volume, from same manufacturer were selected. All implants were placed in subglandular plane and inframammary incision was used. In 260 cc implant group, mean preoperative value of 7.32 cm (±0.56) was subtracted from mean postoperative value of 8.38cm (±1.21) and showed a change of 1.06 cm. The group of patients with 350 cc implants and a mean preoperative value of 7.73cm (±0.89) changed to 9.01cm (±0.81) showing a difference of 1.28 cm. The extra stretch of 0.22 cm was seen six months postoperatively when 90cc heavier or larger implants was used. The postoperative values were statistically significant as well ($p<0.001$) (Table 4).

**Table 4 -** Comparison of Pre- and post-operative measurements when 260cc and 350cc implant were placed in subglandular plane.

| Implant Size | Marked preoperative mean (cm) | Postoperative mean (cm) | Difference (cm) |
|---|---|---|---|
| 260 cc | 7.32 ± 0.56 (n=102) | 8.38 ± 1.21 (n=102) | 1.06 |
| 350 cc | 7.73 ± 0.89 (n= 254) | 9.01 ± 0.81 (n=254) | 1.28 |
| | P<0.001 | P<0.001 | |

## Statistical Analysis:

The data was analysed using the student t-test to compare measurements of nipple to marked IMC incision with four months postoperative nipple to neo IMC distance. Student t-test data was also used to analyse measurements of preoperative nipple to marked IMC incision and postoperative nipple to neo-IMC distance, when implants of 260 and 350cc sizes were used in subglandular pocket. All tests were considered statistically significant at the significance level of $p< 0.05$.

## Discussion:

Biologically, breast gland is a dynamic structure and anatomically lies in a prepectoral plane extending between 2nd and 6th rib. With this fixed base, breast depends differently, in almost every other female. Topographically, an aesthetic breast has two distinct components, each having an anatomically different shape. The upper half or pole is bi-dimensional with a downward slope and the lower half, or pole, is round and multi-dimensional and extends beyond its attachment at IMC. In augmentation mammoplasty, these two anatomically distinct components require separate aesthetic consideration to achieve a natural enhancement and is the reason for the introduction of an anatomical implants. Regardless of its varying shape in its upper or lower half, the breast gland lies in a prepectoral plane and the reason for the subglandular pocket selection for implant placement.[6] It is a common practice to perform a pinch test in parasternal area to check for the adequacy of breast parenchyma. This helps to establish the adequacy of implant coverage in its postoperative period. However breast gland is a biologically active and its consistency varies from individual to individual and changes within an individual from time to time.[5] Skin, another component of breast envelope, on the other hand is elastic in nature and has no mechanism of its own to resist or counter gravity related factors. Once implant is placed in a subglandular pocket, the envelopes stretches straight away, making it thinner than its preoperative state. Continuous pressure of the prosthesis on the breast parenchyma brings about further thinning or atrophy of the breast envelope over a period of time. These changes take place regardless positioning of the prosthesis and are compounded with gravity, size of the implant and associated changes seen with pregnancy, weight or body fat loss or changes related to age. For these reason a preoperative pinch test of 2cm in parasternal area may not provide a back up in subglandular pocket over a period of time. These patients often come back after few years with traction rippling or secondary ptosis secondary to envelope stretch requiring submuscular repositioning with uplift when a revision surgery is performed. When prosthesis is place in a submuscular plane, the breast envelope has an additional layer of tissue. This muscular layer is an active and functional with a capability of toning itself. The intact muscle parenchymal interface is capable of

resisting and counteracting the changes commonly seen after breast augmentation and by keeping the muscle toned, this layer can prevent or reduce secondary changes of augmentation mammoplasty seen in subglandular pocket.

The robust and resisting nature has been well observed and documented.[2,3]

Literature search has shown no objective study done in the past where lower pole of the breast has been measured in these two planes and compared to evaluate the preoperative and postoperative volumetric changes. This is the first such analysis carried out where measurements were done to compare preoperative and postoperative results to demonstrate the benefit of mammoplasty in submuscular plane.

Objective analysis of data in the current study also demonstrates the effect of the weight and size of an implant on breast envelope. Measurements and results of 260cc and 350cc prosthesis, placed in subglandular plane, were retrieved for comparative analysis. Preoperative nipple to marked incision and postoperative nipple to neo-IMC distance data was analysed. The difference between the value of preoperative and postoperative measurements of 350 cc implants was higher when compared with 260cc implants. It was seen that 350cc implants, with extra 90 cc of volume, resulted in additional expansion of 0.22 cm in lower pole of the breast in six months time. (Table 4)

## Conclusion:

Comparative analysis of breast envelope expansion in two different pocket demonstrated that submuscular pocket is supportive to the ever-changing breast envelope. Prosthesis placed in a submuscular extends longevity to the results.

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