Abstract:
Breast Augmentation is one of the most common aesthetic procedures performed with a very high satisfaction rate. After the description of first report of implant placement in 1964 by Cronin and Gerow, the popularity of the procedure is on the rise. The complications are few but require thorough understanding of each one of them for their prompt management and treatment. The procedure is generally performed by a prosthesis or implant. These implants are available in different sizes, shapes and profile and the surface of implant shell can be textured, micro textured or smooth with advantages to each type.

Procedure can be performed through submammary, intra-areolar, axillary or transumblical approach. These implants can be placed in partial submuscular, dual plane, muscle splitting biplane, subfascial and subglandular pockets with advantages to each.

In this chapter, over 1700 breast augmentations performed by the author were reviewed. All procedures were performed under general anaesthetic. Textured and smooth surface implants were used and using intra-areolar or submammary incisions, the devices were placed in partial submuscular, subglandular and muscle splitting biplane. All patients had at least single intravenous antibiotic and most of the procedures were performed as day cases.

Complications following breast augmentation are few and may present early or late. Early common complications are haematoma, seroma, infection and Mondors’ Disease. Late complications include capsular contracture, implant rupture, malplacement of implant, dynamic breasts, implant flipping and rippling of the implant etc. The management and treatment of these complications were assessed and out come evaluated.

Synmastia, bottoming down, periprosthetic infection and dynamic deformities are revisited and their treatment plans redefined. Mondors disease incidence, asymptomatic as well as symptomatic, was researched and its various presentations associated with breast augmentation described. Implant rupture, its association with quality and handling was reviewed. Implant rupture, its presentation and treatment plan redefined. Relationship of infection to length of antibiotic is analysed and various treatment modalities of periprosthetic infection and their outcome was assessed and suggestions and strategies for their management outlined.

Breast augmentation is a procedure with a very high satisfaction rate however complications arising following augmentations needs to be carefully evaluated and require a proactive and appropriate action plan. An informed consent should ideally include information outlining benefits of breast augmentation, possible complications along with the management plan of each one of them.

Introduction:
Historically women’s breasts have always been considered as an attractive part of their body with an important anatomical, physiological and above all psychological role. A confident image of a woman is essential for her self-esteem and to carry out a competitive and constructive role in present day society. Almost every woman requesting augmentation mammoplasty expresses lack of confidence which in turn may affect her work, relationship with her partner, social life, choice of clothing, holidays etc. The patients requesting augmentation mammoplasty may feel inadequate due to the small size of the breast, their shape or associated asymmetry. They feel confident postoperatively with the attainment of a proportionate body that boosts their role in an interacting environment.

It is interesting that, with the similar anatomical base, every breast depends in a way that makes it appear different in almost every woman. The breast is composed of parenchyma, fat and skin and all three components are dynamic in nature and changes are seen in a woman right from the onset of puberty. These changes are noticed during normal cyclical changes of the month, due to body weight or fat changes, during pregnancy and lactation and are also seen with the passage of time. Request to regain the shape and enhance the size of a breast is quite natural and implants quality, safety and choice have played an equally important role in the continued popularity of the procedure. Since the first report of implant placement in 1964 by Cronin and Gerow, a large number of women have benefited from the procedure, that has almost certainly improved their quality of life. This is the reason that breast augmentation using breast implants, is one of the most common aesthetic procedures performed by plastic surgeons today. The current chapter is dedicated to the techniques, complications and management of complica-
tions related to augmentation mammoplasty using breast implants.

Surgical anatomy and aesthetic considerations:
The breast in a female is highly variable but the size of the base of the breast is fairly constant and extends from second to sixth rib in midclavicular line. From this circular base the breast protrudes and depends to a degree that varies in almost every individual female.¹ The unique anatomical shape of breast always appears different when viewed from different angle. An aesthetic breast has four anatomical boundaries but only three of them are visually distinct. In a dependent position, upper pole gradually merges with the bidimensional upper chest, medial, lower and lateral limits forms the other three anatomically distinct boundaries. Inframammary crease, extends from 5th and 6th rib medially curves down and extends to 7th or 8th rib laterally to the anterior axillary line, mid point usually lies just behind the areola at a level of 6th rib in midclavicular line.¹ This crease is a defining structure of a developed breast and its robust anatomical presence has led to the basis of the classification of ptosis.⁵ Anatomically, the crease is a microscopic structure due to condensation of superficial Camper’s fascia and the deeper Scarpa’s fascia.⁶ Medial boundary of breast or fold has its origin from the lateral border of sternum and together with the contra lateral breast, forms the cleavage of the breast. Although an auxiliary tail of the breast gland extends into the medial wall of the axilla, the lateral extent of the breast is defined by the lateral breast fold, which in turn, should aesthetically and ideally be limited by a line drop from anterior axillary line. These three visible boundaries, in a natural looking and dependent breast are the parameters within which an aesthetic surgeon has to plan the surgery. These parameters also dictate the shape and size of the implant and the pocket in which the implant needs to be placed.

Arterial anatomy. Blood supply to the breast is through multiple sources and includes thoracoacromial axis, internal mammmary, lateral thoracic and intercostal arteries and their perforators.⁷ This rich arcade of blood supply make devasculariaison of breast envelope almost impossible even after extensive pocket dissection. However, the blood supply of the breast envelope is better when a plane is dissected in a submuscular plane as the pectoral perforator system, arising from internal mammmary artery and thoracoacromial axis, remains undisturbed.⁷

Nerve supply. Nerve supply to the breast envelope is mainly from the 2nd to the 6th anterior and lateral cutaneous branches of the intercostals nerves. The nerve supply to the nipple areolar complex is from the anterior and lateral coetaneous branches of the 3rd, 4th and 5th intercostals nerves.⁸ The sensory changes to the breast and nipple areolar complex, therefore, varies with the approach used for the surgery and pocket selected for implant placement.

Examination:
Preoperative examination and plan of surgery is the most important aspect of augmentation mammoplasty. A thorough assessment, bilateral exchange of information, views and limitation of the procedure should take priority and proceedings documented at the same time. A pro forma detailing all aspect of examination, finding and plan of surgery is a useful adjunct. Envelope characterstics, history of breast cup size changes in the past, asymmetries of breast, ribs, costal margin and sternum should be documented. Implant selection is the most important aspect of the consultation and a very well executed surgical technique can be futile if the base, profile and size of the implant is not corresponding and proportionate to the breast width, size and compliance of the available skin envelope. When there is an inadequate tight skin envelope, a disproportionate size of implant may be difficult to place and an inflatable implant can be reasonable option in these cases. On the other hand, a breast with small envelope with a history of change of breast size can allow and accommodate a larger implant. In authors experience 125cc to 150cc on a band size of 32 to 34, is sufficient to top up the breast cup size by one.

Breast Asymmetries:
Asymmetries of breasts can adversely affect the outcome and involves breast volume difference, nipple level difference in vertical axis⁹ or its placement in horizontal axis.¹⁰ The disparities may also exist in nipple to inframammary crease distance, nipple areolar complex size or inframammary crease level. Associated ribs, chondrocostal or sternal deformities can also affect the outcome of augmentation mammoplasty. These asymmetries are common and an incidence of up to 87.8% have been reported.⁹ In a prospective study performed by author,¹¹ a breast size difference was present in almost half of the patients, of these left side breast was larger twice as many times than on the right, nipple areolar level was different in one third of patients and left nipple areolar complex was twice as commonly lower than right. Similar observations were made when inframammary crease measurements were recorded and were twice as common on the left as on the right. Different degrees of chest asymmetries were present and again they were significantly commoner on the left side. However only minority of these patients needed a different size implant and even fewer needed unilateral mastopexy for nipple level correction in vertical plane. When nipple placement is asymmetrical in horizontal plane, it was more common on the right and author lateralises the pocket on the affected side to offset its appearance.¹⁰

Choice of incisions:
There are four incisions available to approach and dissect an implant pocket. The choice of incision is basically determined by the choice of the patient or surgeons experience. Most commonly used incisions are periareolar and submammary, both giving equally good access to all available pockets with good scar healing in vast majority of the patients. Submammary and areolar incisions can allow an adequate visual and tactile feed of a dissected pocket and inframammary crease repositioning in a hy-
Anatomically breast is anterior to the muscle and ideally an implant should be placed in front of the muscle. This is the reason that first implant was placed in subglandular plane, however an unacceptable rate of capsular contracture led to the placement of implant completely behind the muscles. This pocket did reduce the rate of capsular contracture but flat muscles is not able to give a natural three-dimensional result and also had a high surgical morbidity. The reduction of capsular contracture in submuscular pocket was recognised and less extensive muscle cover in the form of partial submuscular pocket was introduced. This was a good marriage between subglandular and complete submuscular pockets that allowed the breast lower pole to expand naturally in a hypoplastic breast. The technique was adopted by many plastic surgeons, especially after the introduction of saline implant, where muscle cover is essential for more natural look and feel. Although a lot of patients did benefit from this new combination but patients with lower pole skin excess are unable to get adequate and satisfactory results. Inadequate communication between submuscular and subglandular pocket does not allow the implant to fill out the lower pole. To fill out the relative skin envelope excess, dual plane technique is introduced in which varying degree of muscle is released anteriorly from the breast and posteriorly from the intercostals margin, depending on the skin envelope excess. This intentional release allows the muscle to shift superiorly allowing the implant to fill the lower pole adequately. However, when a muscle is released from its fixed bony margin and acquires its new attachment to the breast, a voluntary or involuntary movement of muscle pull the soft tissue of the breast resulting in dynamic breast deformity. These deformities are seen in vast majority of the patient to a varying degree. Subfascial pocket is another choice in which dissection under anterior pectoral fascia gives an additional layer to the breast envelope. The procedure has the advantage of excluding surgical morbidity associated with muscle release including dynamic deformities. A new submuscular pocket has been described in which upper part of the prosthesis lies in submuscular plane while lower part of the implant lies in subglandular plane. This allows the implant to enhance or expand the lower pole of the breast uninhibited by the flat pectoralis. The pectoralis in this plane has a unique relationship to the implant and lies in front and behind the prosthesis at the same time. Muscle is split obliquely along its fleshy fibres, up and laterally, to the anterior axillary fold instead of cutting across its tendinous origin along the costal margin. The split along the fleshy fibres make it less painful procedure and patients have a quicker recovery. Muscle efficiency remains undisturbed due to lack of muscle release from the costal margin and its origin remains attached, preventing dynamic breast deformity. Author has used the technique consecutively in over 800 bilateral primary augmentation mammoplasties alone, in last 3 years. The technique can be used to convert a partial submuscular pocket in to muscle splitting pocket, correcting dynamic muscle deformity.

**Choice of available pockets:**

Selection of implant pocket is an important aspect of the surgery. Common early Complications:

**Complications:**

1) **Common early Complications.**

Haematoma after augmentation mammoplasty is a known but uncommon complication. A large Danish study reported an incidence of 1.3% in 875 patients over a period of 20 years. All had their implant placed in...
Infections resulting from atypical Mycobacteria may have all the hallmark of infection with negative routine bacteriological results and these infections are resistant to routine antibiotic treatment. Acid fast bacilli staining must be considered for an early antituberculous therapy. Sterile pus has been reported secondary to silicone implant rupture with out classical hallmark of infection or bacterial growth on microbiological cultures. The sterile pus in these cases is a result of non-infectious inflammatory response to leaked silicone and present as an autoinflation of breast. This acute but progressive swelling act as a marker of implants rupture and lack of bacterial growth allows it to be managed as a single stage procedure.

**Mondors disease:** Mondors disease or thrombophlebitis of thoracoabdominal axial veins is due to an interruption of venous blood flow. Retrograde flow through collateral vein is prevented due to unidirectional valves in these axial veins. Organised blood in these vessels appears as painful fibrous cord usually referred as Bow String sign. An incidence of 0.95% has been reported in oncologic breast surgery. On the other hand, in augmentation mammoplasty carried out through inframammary incision, an incidence of 1.07% and 4.55% has been reported in symptomatic and asymptomatic cases respectively. Mondors’ disease following augmentation mammoplasty, using inframammary approach, affects the thoracoabdominal system of veins, however, the process may involve axillary veins and has been reported after axillary nodes dissection in a patient with silicone lymphadenitis. Mondors’ disease following augmentation mammoplasty using areolar, axillary or transumblical approach has not been reported. Regardless of the approach or distribution of the area of involvement, the process is self-limiting and usually disappears after 6-8 weeks without any adverse affects.

### 2) Common late complications:

- **Asymmetries**
- **Dynamic Breasts**
- **Implant rupture**
- **Capsular contractures**
- **Rippling**
- **Flipping or malorientation of implants**
- **Implant malplacements:**

Capsular contracture and asymmetries due to implant malplacement are frequently seen complications following augmentation mammoplasty. Incidence of capsular contracture is far less common due to subpectoral position of the implant, better sized implant pockets and better quality implants. Revision surgery secondary to implant malplacement is the second most common cause.

These implant malplacement may present as superior (high rising breast) medial (symmastia) lateral (telemastia) and inferior (bottoming down) and can be unilateral, bilateral, asymmetrical, combination of two or can be secondary to capsular contractures. Bottoming down With continued rise in the absolute number of breast augmentation performed today, bottoming down is seen more commonly than before. It is considered the...
commonest presentation of malplaced implant. Bottoming down or implant ptosis is viewed as progressive shortening of distance between nipple and breast fold and is the most common form of the implant malplacement. This deformity is almost always due to the result of implant descent or its malplacement. In subglandular pocket, downward transgression of implant usually accompanies inframammary crease (IMC). Whereas bottoming down in submuscular pocket may manifest independent of IMC descent, presenting as double bubble deformity. The process is quite often due to oversized pocket dissection in the lower pole area of the breast. Bottoming down can be unilateral, bilateral, asymmetrical and may present in combination with symmastia (medial malplacement) and telemastia (lateral malplacement). The complication can equally be seen with augmentation mastopexies or breast reconstructive surgeries. The process of bottoming down can be due to multiple reasons and can be the result of gravity, size of the implant, pocket used for its placement, stretching of the thin envelope, stretching of scar in vertical scar mastopexy with mammaplasty, early and heavy pectoral exercises, local steroids etc. Bottoming down can be a direct result of oversized pocket and is more often seen when inframammary crease is approached from a distant place through transaxillary approach or can be due to disruption of the IMC in transumbilical breast augmentation. Distant approach for pocket dissection may produce a lack of tactile or visual feedback and probably is the reason for more common breast asymmetries or malplacements seen in later approaches. The complication can also be seen when over recruitment of skin is performed when planning a pocket, using an inframammary crease incision, in a hypoplastic breast. To prevent malplacement, pocket markings and dissection should be planned and executed precisely in an augmentation mammaplasty regardless of the incision used.

The surgical anatomy of the local region can explain the complication when it manifest differently in the same pocket dissected through different approaches. Bottoming down and downward displacement of IMC and implant, following subglandular augmentation, is usually independent of nipple areolar complex and results in unusually high nipples. Corrective surgery is aimed at relocation the IMC at a higher place and treatment can be conservative or invasive and depends on the timing of diagnosis after mammaplasty. Combined downward transgression of IMC and NAC require combined IMC relocation and mastopexy to maintain normal relationship between these two important anatomical landmarks. Higher relocation of IMC will result in induction of ptosis and mastopexy alone will result in worsening of bottoming down. Bottoming down in submuscular pocket, however, can manifest with out lowering of the IMC and can be a direct result of over dissection in the lower pole, when performed through axillary approach. Double bubble is the direct manifestation of the undisturbed infra mammary crease, where implant is covered by pectoralis and its extended fascia. Treatment of bottoming down include conservative or minimally invasive, multilayer capsuloraphy, repair may require autologous local capsular flaps or allogenic dermal grafts for skin support. Author routinely change the pocket into muscle splitting biplane along with multilayer capsuloraphy, if the bottoming down is seen following mammaplasty in subglandular pocket. The change of pocket helps to improve the upper pole aesthetic, conceal the pre-existing rippling, if present and addition of muscle layer helps to enhance the longevity to results.

**Synmastia:**
Synmastia is a relatively uncommon form of implant malplacement seen following augmentation mammoplasty and is seen in subglandular as well as submuscular plane. The deformity is due to the confluence of medial part of the breast. This is generally due to over dissection in the medial aspect of the breast or can be the inappropriately larger size of the implant. The tenting of the medial aspect of the breast envelope over the sternum can be an early sign of the deformity. The true incidence of synmastia is not known and quite often the patient is not aware of the complication. These deformities may present individually, may present in a combination, can be unilateral or bilateral and are also seen when an implant pocket dissection is performed either for mastopexy or breast reconstruction. The condition is quite often described along with other implant malplacement and only handful articles are written on this complication. Treatment of choice is capsuloraphy, and AlloDerm grafts can be added to reinforce capsuloraphy. Inflatable implants is another option to allow the repair to consolidate before the delayed expansion of the prostheses. Change of pocket into muscle splitting biplane is an option to correct synmastia following subglandular augmentation. Procedure allows the deeper unused subpectoral anatomy to recreate medial boundary of the pocket. The procedure does not require capsuloraphy and improves the breast aesthetic and longevity of the results at the same time.

Synmastia has been classified into developmental, acquired or secondary capsular contractures.

**Telemastia:**
Telemastia is the mirror image malplacement of synmastia and is more commonly seen in clinical practice than synmastia. Telemastia generally can be caused by over dissection of breast pocket in its lateral quadrant, inadequate muscle release of sternocostal pectoralis in partial submuscular plane or can be secondary to capsular contracture. Treatment or correction can be achieved with lateral capsuloraphy and medial mirror image Capsulotomy.

**Dynamic Breasts:**
Dynamic breast or animation deformity is a common complication frequently seen after partial submuscular
and dual plane augmentation mammoplasty. The incidence is high and presents with varying degree. The deformation is not seen when muscle is placed in subglandular or subfascial plane. Muscle splitting biplane augmentation is a submuscular choice with extremely low risk of dynamic deformities. The pathophysiology of the process is due to the release of pectoral from its fixed attachment on sternocostal margin. Muscle release results in loss of its specialised covering, epimysium and ability to glide under the skin. When this part of the denuded muscle gains its new attachment to skin and breast parenchyma, it acquires the ability to pull or displace the breast, a process seen in domestic animals and is due to panniculus carnosus. The resulting animation deformity may displace breast alone with or without implant displacement. In an inadequate release of muscle, strong and long fibres of pectoral are capable of displacing the implant and widening of cleavage is seen without breast displacement. On the other hand, muscle release and its displacement from sterno costal margin to breast parenchyma and skin or its attachment to the capsule of the implant may result in glandular as well as implant displacement. The complication and process of animation deformity can be largely prevented by avoiding the muscle release as in submuscular muscle splitting augmentation or by placing the implant in prepectoral position, either in subfascial or subglandular plane. In an established deformity, changing implant from dual plane to subfascial plane or changing partial submuscular to muscle splitting plane has been documented to eliminate dynamic breast deformity.

**Implant rupture:**
Rupture of the implant can be due to biochemical degradation of the silicone, injury to the implantation during implantation, fold flaw failures, or as a result of mechanical injury including mammography and closed capsulotomies. Estimates of breast implant rupture prevalence varies widely in different studies and ranges from 0.3% to 77%. This wide difference is due to the difference methods used.

Institute of Medicine of America, in 1999, defined silicone breast implant rupture as a breach of any size in the implant shell and reported that all silicone gel implants were susceptible to silicon bleed through the implant shell. Unlike saline implants, presence of the shell rupture does not allow the silicone prosthesis failure to be picked up easily. In majority of the cases, the rupture is intracapsular, where the silicone is retained with the fibrous capsule and no volumetric changes are seen. Silicone gel rupture is more likely to be symptomatic when the rupture is extracapsular where it has extended beyond the fibrous capsule. However silicon gel leak can only be confirmed after explantation of the prosthesis, a procedure only carried out in symptomatic patients. Quantitative data is lacking on the prevalence of silicone implant rupture. Several studies have been carried out since Institute of Medicine meeting in 1999 but to date only one study has been considered reliable prosthesis rupture prevalence. Holmich et al, in their study, concluded that approximately 2% and 15% of third-generation implants that are intact after 3 years can be expected to develop definite ruptures by 5 and 10 years, respectively. Marotta et al in their meta analysis have confirmed that there was a general reduction in tensile strength, tear strength, and elongation for all types of explanted elastomer shells, representing a marked loss in the strength and durability of the shells. These changes in the physical properties of the shell make it more vulnerable to the physical stresses experienced by the implant in vivo. This factor alone is responsible for marked increased in rupture rates of prosthesis with time due to weakened by silicone fluid-swollen silicon swollen shells, a view not shared by Brandon et al. Diagnosis of silicon gel implants rupture is not easy and clinical history and examination alone is not reliable. Marques et al in their study found that there were patients with less than five years implantation with tight capsular contracture unrelated to gross silicon leakage. There were also patients without significant contracture and leakage or ruptured implants. It is quite common to have an asymptomatic silent ruptured implant and quite often there is no history of significant chest trauma. Prevalence of rupture of an implant can be difficult to assess because same implant used by different surgeons gives different results while same surgeon has different results when using different implants. An ideal implant should be able to withstand an average force used by surgeons during its insertion. An adequate skin incision is mandatory for a cohesive gel implant placement, small incisions require more force to insert an implant and may lead to a higher incidence premature implant failure. MRI is the most commonly employed investigations to diagnose ruptured silicone gel implants. In surgically validated meta-analysis, MRI diagnoses of implant rupture, a sensitivity of 89% and a specificity of 97% with a positive predictive value of 99% has been reported. MRI scanning has the ability to delineate water droplets, air bubbles or other trapped material mixing with the silicon gel with in the implant called Salad Oil Sign. In this patient would have been helpful to pick up intraprosthetic migration of sterile pus. Mammography also is frequently done to screen implant integrity, it is inexpensive, easily available. Although it can delineate extracapsular ruptures, procedure can be difficult to perform in painful breast with capsular contractures and on its own can result in implant damage. Ultrasonography is commonly performed to screen implant integrity but has little value however it can be complementary to the mammography. Stepladder sign seen in ultrasonography is considered a diagnostic sign of implant rupture and free or leaked silicon in breast tissue is visualised as Snow Storm appearance, similar low level echogenic appearances seen in axillary lymph node is diagnostic of silicon
lymphadenitis, a sign which can pick a silicon gel bleed in the absence of loss of implant shell integrity. However the procedure is operator dependent and is unable to visualise the damage to the posterior aspect of the implant or posterior surface pectoralis silicon extravasation.

Autoinflation:
Autoinflation of breast is an uncommon but important complication. Autoinflation can be intraprosthetic or extraprosthetic. Intraprosthetic migration resulting in autoinflation is commonly due to saline. Spontaneous autoinflation, in these implants is due to the large macromolecules crossing the implant shell possibly due to the osmotic difference of solutes across the implant shell. Autoinflation of implant with sterile pus has been documented as well and can be associated with autoinflation of the breast with sterile pus. The sterile pus is an inflammatory response to leaked silicone and can be a marker of silicone implant rupture. Late autoinflation of breast with intracapsular seroma formation has been reported in silicone gel implants.

Presence of intracapsular fluid is a common observation and has been reported to be present in 21% of patients in symptomatic augmentation mammoplasties. Symptoms were either local, presenting as breast pain or capsular contracture or general as fatigue, arthralgia and paraesthesia. Presence of fluid was not limited to any particular type of implant and was equally seen in textured silicone, textured polyurethane or smooth silicone implants with almost equal distribution. The amount of fluid aspirated in these patients was small and varied in its consistency from clear, turbid to xanthochromic.

Rippling:
Rippling of an implant is quite a known complication seen after augmentation mammoplasty. Rippling has normally two components, visible and palpable. Visible component can be present in upright position and made worse on leaning forward or only present on leaning forward otherwise known as traction rippling. Palpable rippling can be present with or with out visible rippling. Both, visible and palpable rippling and their distribution on the breast, depends on the type of the implant, thickness of the available pocket, pocket used for the implant positioning and relative dimensions of the pocket and implant diameter. Physical features of the saline implants have made it more prone to rippling and submuscular positioning has allowed concealing this physical characteristic in the upper part of the breast. However, the rippling can still be present, with or with out traction, regardless of the type of implant, in the lower and outer pole of the breast. Thicker the envelope less is the rippling. Pinch test has been used to determine the positioning of a silicone gel implant and when there is an inch to pinch, subglandular positioning of these implants is considered adequate. However, breast tissue, with all its three components of Skin, fat and parenchyma, is dynamic structure and all these vary from time to time in female. The common factors affecting these three components are, body weight changes, body fat changes, pregnancy and breast feeding, ageing. Implant placement itself stretches the envelope and continuous pressure on compressible breast envelope by a non-compressible implant thins out the breast envelope. Longer the implant in a breast or younger the age of the patient at the time of implantation, more breast envelope changes are expected. A combination of muscle and breast envelope makes it more resilient to the changes seen in a breast and submuscular positioning give longevity to the results.

Capsular Contracture:
Capsular contracture following breast augmentation is still considered one of the commonest complications requiring medical and surgical attention. Causes of capsular are multiple and quite perplexing and the overall reported incidence varies between 4 to 17% of the women. With continued changes in implant characteristics including texturing of the implant and subpectoral placement, the contracture rate has been less frequently seen although up to 70% has been reported in subglandular plane alone. Most of the studies are retrospective, the only prospective study where the capsular contracture was objectively assessed, an overall incidence of 4% of capsular contracture was reported with a follow-up ranging between 3 months to 4 years. Only one third of the patients were graded as Baker III and IV. Although the rate of capsular contracture has changed from First generation to the current Fourth-generation implants, Henriksen et al studied the capsular contracture on the basis of the characteristics of implants and characteristics of patients. In general retropectoral implants placement has reduced the capsular contracture rate or perhaps intervening muscle may be acting as a buffer to conceal the degree of contracture or its external manifestation. Adequate size pocket also helps to reduce the clinical manifestation of capsular contracture. Early concentric forces exerted by capsular activity can be accommodated by a little larger pocket. As not all the capsular contractures proceed to Baker Class III or IV, an adequate or slightly larger pocket may allow the initial compressible forces exerted by the capsule to be absorbed by an incompressible implant. Haematoma is another known cause of capsular formation prevention of this surgical morbidity is absolutely essential. In an untreated haematoma or in a subclinical haematoma, blood gets organised and can contribute towards capsular formation. Insertion of a drain with an inadequate haemostasis will not prevent a haematoma or blood may continue to build once drains are removed and can lead to the process of capsular formation. The infection is another known factor leading to capsular formation, Staphylococcus aureus is the commonly isolated organism in periprosthetic infections. However in an established capsular contracture, it is the staphylococcus epidermidis which has been found in the up to 87% of the culture of capsules, either alone or in combination. The timing and mechanism of Staphylococcus epidermidis replacing Staphylococcus...
There is an abundance of literature about the association of silicone and systemic and localized autoimmunity and connective tissue disorders. The case reports available in literature envisage links between silicone and a number disorders including, scleroderma, rheumatoid arthritis, systemic lupus erythematosus, depigmentation, Sjogren’s syndrome, polymyositis etc. These disorders and their association with augmentation mammoplasty has been studied and there was any significant difference when compared with large population based control samples. Our bodies are exposed to silicone as it is used in both personal and domestic products. Silicone from these sources is primarily absorbed from the skin and the gastrointestinal tract. As a trace element, silicone makes up part of the building blocks of skin and bone connective tissues, notably collagen, and currently is commercially available as a nutritional supplement.

Several studies were conducted in the past to evaluate the potential risks and claims regarding the adverse effects of silicones on women receiving breast implants. These studies focused particularly on connective tissue diseases, and the results showed that none of these claims and risks were linked or associated with silicone breast implants. The Independent Review Group in England has reported that after gel bleed, small molecules of silicone are handled by the body in exactly the same way as silicone molecules from other sources. This report includes extensive research on all the relevant aspects of silicones related to the health of patients including its inflammatory and immunologic role. Goldblum et al reported antisilicone antibodies to ventriculoperitoneal shunts, but further studies by independent workers did not confirm the observation of antisilicone antibodies. Wolf et al showed that sera from patients with ruptured silicone breast implants had more circulating immunoglobulin G (IgG) than sera from patients with intact implants, diabetic women on insulin exposed to silicone in syringe lubricants, and healthy women with no silicone breast implants. The American Council of Science and Health later challenged these results in 1997. It was concluded that current evidence does not support the claims that silicones themselves provoke antibody responses in vivo. However, in animals, self-proteins absorbed to silicone polymers can induce an antibody response, and silicones may sometimes have a modest adjuvant effect on antibody production. Nevertheless, there is no evidence that the response can cause tissue damage. The Independent Review Group considered that more research was needed to verify the proliferation of lymphocytes against collagen types I and III, fibronectin, and fibrin in women with silicone gel breast implants. The other available work done with adults and children demonstrating a proliferation of T lymphocytes was poorly controlled, and the findings were reported in a way that made them difficult to interpret.

A Danish epidemiologic survey studied the effects of silicone gel implants on esophageal disorders and found a threefold excess in children born to mothers with breast implants. However, this excess was present in the chil-
Large epidemiologic studies have studied the risk of cancer after breast augmentation and have shown that there was a smaller risk of incidence of breast cancer in patient with breast implants and that blood from patient with augmentation mammoplasty has the ability to kill breast cancer cells in tissue cultures. Similarly there was no difference in diagnosis and 5-year and 10-year survival rate in augmented and nonaugmented patients. These studies do not imply that an augmentation mammoplasty can give some protection against breast cancer in women but clearly establishes that there is no association between silicone implants and breast cancer. Minimally invasive and non-invasive options and future of breast augmentation surgery.

Autologous fat transfer of fat for breast enhancement has been described by Lexer in the literature going back to early twentieth century and was revisited by Mel Bircoll in 1985 but was soon deplored by American Society of Plastic and Reconstructive Surgeons in 1987. The committee decision put a halt on the procedure and the option was tabooed to be reviewed for a long time. It was not until Coleman revisited the fat grafting to the breast in 2007. Improvement in techniques involving harvest, preparation and injection of fat gave a new direction to the use autologous fat transfers to breasts. Adipose-derived mesenchymal stem cell as a regenerating agent and its clinical application in breast surgery grafts has given a huge impetus to its application and broadening our understanding of this fascinating concept. However the results are quite operator dependent and complications are not uncommon. Lack of availability of the donor sites and limited improvement in breast cup size in a single session has not given it a wider acceptance as an alternative to breast implants. Stabilized hyaluronic acid of nonanimal origin (NASHA™ gel; Q-Med AB, Uppsala, Sweden) has been in used for facial filler and wrinkles treatments for sometime, its wide popularity has made it possible to potentially use it as an option for breast enlargement. The available product is marketed as Macrolene™ (Q-Med AB) and was approved in Europe in 2006 and is available in two volume restoration factors, VRF20 and VRF30, and both have received CE mark. The product gives temporary enhancement and the reported bilateral mean injection, per patient, was 211 ml. Though it gives a good options to patients not keen on implant surgery, however, limited improvement in cup size, its temporary nature and high post injection inflammatory reactions are limiting factors.

but the safety of the breast implants, nature of the procedure with persistent good results associated with a satisfied patient make it almost impossible that implant surgery will be replaced in the foreseeable near future. The tissues ability to grow when subjected to sustained, low-level mechanical distraction has given a new dimension to breast augmentation surgery. The concept is applied to augment and enhance breast size. This nonsurgical non-pharmaceutical external device has been studied, clinically applied and is a fascinating development that gives an added choice to patients who are not keen on invasive or minimally invasive procedure available for breast enhancement. However the limitation of enhancement is the limiting factor. To conclude, the safety and choices of implant shape and sizes and the techniques available, make the implant surgery the most sought after option for breast enhancement surgery in the foreseeable future.

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