

Literature Review on the Different Types of Breast Implants: Advantages and Disadvantages

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ABSTRACT

Breast implants are devices used in cosmetic and reconstructive surgery to increase the volume and improve the shape of the breasts. In this study, the different types of breast implants available in clinical practice were investigated. Four main types were identified: saline implants, silicone gel implants, highly cohesive silicone gel implants, and double lumen implants.

Saline implants consist of a silicone shell filled with sterile saline. They have advantages such as the ability to adjust volume during surgery, easy rupture detection and lower cost. However, they may have a less natural feel and a higher risk of wrinkling and rippling.

Silicone gel implants are widely used because of their more natural look and feel. Silicone gel is cohesive and offers a consistency similar to breast tissue. They have a lower incidence of wrinkling and rippling, greater durability and less sensitivity to cold. However, detection of ruptures can be more difficult and there is a potential risk of capsular contracture.

Highly cohesive silicone gel implants, also known as anatomical implants, are designed to mimic the natural shape and projection of the breast. They have predictable aesthetic results, a lower incidence of capsular contracture and greater resistance to displacement. However, they may require longer incisions and have a higher cost.

Double lumen implants have two separate shell layers, one internal with cohesive silicone gel and the other external with saline solution. They offer an additional layer of security in case of rupture of the inner shell and allow volume adjustment during surgery. However, they may have a less natural feel and greater technical complexity.

ARTICLE DETAILS

Published On:
29 May 2023

Available on:
<https://ijmscr.org/>

INTRODUCTION

Breast implants are medical devices used in breast plastic or reconstructive surgery to modify breast shape, size and volume. They consist of prostheses specifically designed for insertion into the breast region for the purpose of improving the aesthetic appearance of the breasts or correcting congenital or acquired defects.^{1,2}

These implants are mainly composed of an external shell, typically made of silicone elastomer, which provides a protective barrier between the implant and the surrounding tissues. The shell can have different characteristics, such as surface texture or smoothness, depending on the type of implant used.^{3,4}

As for the internal content of breast implants, there are several options available. One of the most common options is cohesive silicone gel, which is a viscous, elastic substance that is held in place in the event of a rupture of the implant

shell. Another type of implant uses a sterile saline solution, which is inserted into the implant shell after placement in the breast. In addition, there are breast implants containing highly cohesive silicone gel, known as anatomical or teardrop-shaped implants, which are molded to mimic the natural shape of the breast.^{5,6}

There are different types of breast implants available on the market, which may vary in composition, shape, surface and filling. Some of the most common types of breast implants will be described below, as well as their uses, advantages and disadvantages.⁷

Saline breast implants: These implants consist of a silicone shell that is filled with a sterile saline solution once it is placed in the breast. ⁸

Advantages

Volume adjustment: One of the outstanding advantages of

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saline implants is that the filling volume can be adjusted during surgery, allowing the plastic surgeon to customize the size and shape of the breasts according to the patient's preferences and anatomical features.⁹

Rupture detection: In case of implant rupture, the saline solution is safely absorbed and eliminated by the body, allowing immediate detection of rupture. This feature facilitates diagnosis and decision making for possible revision surgery.¹⁰

Smaller incision: Saline implants are inserted into the breast through smaller incisions compared to other types of implants, which can result in less scarring and a shorter recovery period.¹¹

Lower cost: In general, saline implants tend to be less expensive compared to silicone gel implants, which may be an advantage for patients with financial constraints.¹²

Disadvantages

Less natural feel: Compared to silicone gel implants, saline implants may provide a less natural feel and a firmer consistency to the touch, which may not be desirable for some patients.¹³

Risk of rippling and wrinkling: Due to the liquid nature of the saline solution, implants of this type may have an increased risk of wrinkling and rippling of the shell, which may result in a less aesthetic and palpable appearance.¹⁴

Increased risk of rupture: Although the risk of rupture is relatively low, saline implants have a slightly higher rupture rate than silicone gel implants. This may lead to implant deflation and require revision surgery.¹⁵

Cold sensitivity: Some patients have reported breast cold sensitivity with saline implants due to the more rapid heat transfer of saline water compared to silicone gel implants.¹⁵

Cohesive silicone gel breast implants: These implants are filled with a highly cohesive silicone gel, which means that the gel maintains its shape and consistency in the event of implant rupture. The silicone shell provides a secure barrier between the gel and the surrounding tissue. ¹⁶

Advantages

Natural texture and feel: Cohesive silicone gel implants offer a more natural look and feel compared to saline implants. Cohesive silicone gel is a viscous, elastic substance that resembles the consistency of breast tissue.¹⁶

Reduced risk of wrinkling and rippling: Due to the cohesiveness of silicone gel, these implants have a lower risk of developing wrinkles or rippling in the shell, which can contribute to a smoother, more aesthetically pleasing appearance.¹⁶

Increased durability: Cohesive silicone gel implants have a higher rupture strength and lower deflation rate compared to

saline implants. This means that these implants may be more durable in the long term.¹⁶

Lower incidence of noises and cold sensitivity: Unlike saline implants, cohesive silicone gel implants are not fluid-filled, which decreases the likelihood of experiencing noises such as "sloshing" and reduces sensitivity to cold in the breasts.¹⁷

Disadvantages

More difficult rupture detection: In case of rupture of the implant shell, the cohesive silicone gel tends to hold together and does not disperse in the body, making it difficult to detect clinically. This implies that it may require an MRI or an additional imaging study to diagnose a possible rupture.¹⁸

Need for longer incisions: Because cohesive silicone gel implants have a more viscous content, their insertion generally requires longer incisions compared to saline implants.¹⁸

Increased risk of capsular contracture: Although cohesive silicone gel implants have been shown to have a low rate of capsular contracture compared to traditional silicone gel implants, there is still a risk of a fibrous capsule forming around the implant, which can cause deformities or changes in breast shape. These implants offer a more natural look and feel compared to saline implants.¹⁸

Highly cohesive silicone gel breast implants: Also known as "anatomical" or "teardrop-shaped" implants, these implants contain a highly cohesive silicone gel that maintains a specific shape and projection.¹⁹

Advantages

Natural esthetic result: Highly cohesive silicone gel implants are designed to mimic the natural shape and projection of the breast. Their highly cohesive composition allows them to maintain a predefined shape, resulting in a more natural aesthetic result and a harmonious appearance with the breast anatomy.²⁰

Reduced risk of wrinkling and rippling: The high cohesiveness of the silicone gel in these implants minimizes the risk of developing wrinkles or creases in the shell, contributing to a smoother, more esthetically pleasing result.²⁰

Stability and resistance to shifting: Due to their anatomical shape and the cohesiveness of the silicone gel, these implants have greater stability compared to other types of breast implants. This means they are less likely to shift or change position over time.²⁰

Reduced risk of capsular contracture: Highly cohesive silicone gel implants have been shown to have a lower risk of capsular contracture formation compared to other types of implants. The formation of a fibrous capsule around the implant is a potential complication in which scar tissue contracts and may deform or harden the breast.²¹

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Disadvantages

Need for longer incisions: Due to the shape and cohesiveness of the highly cohesive silicone gel, insertion of these implants generally requires longer incisions compared to other types of breast implants.²²

Higher cost: Highly cohesive silicone gel implants tend to be more expensive compared to other types of implants, which may be a consideration for patients who are financially constrained.²²

Stiffness to the touch: Because of their high cohesiveness, these implants may have a firmer feel to the touch compared to other implants. Some patients may prefer a softer, more natural feel in the breast.²²

Silicone gel breast implants with smooth shell: These implants are filled with a softer consistency silicone gel and have a smooth shell.²³

Advantages

Natural feel: Smooth shell silicone gel implants offer a closer-to-natural feel compared to textured shell implants. The smoothness of the smooth shell allows for better integration with the surrounding breast tissues, resulting in a feel more similar to natural breast tissue.²²

Reduced risk of capsular contracture: The smooth shell of these implants reduces the risk of fibrous capsule formation around the implant. Capsular contracture is a complication in which scar tissue contracts, can deform the breasts and cause discomfort. The smooth wrap helps minimize this complication.²³

Reduced risk of rotation: The smooth surface of the silicone gel implant shell reduces the likelihood of implant rotation within the breast. This is especially important in the case of anatomical or teardrop-shaped implants, which are designed to maintain a specific position for an optimal esthetic result.²⁴

Predictable esthetic results: The smooth shell of the implants allows for even distribution of the silicone gel, which contributes to more predictable and consistent esthetic results. This is especially relevant in patients seeking improved breast shape and volume.²⁵

Disadvantages

Increased risk of displacement: The smooth surface of the shell may slightly increase the risk of implant displacement compared to textured shell implants. This means that the implant may move out of its original position, which may affect the appearance and symmetry of the breasts.²⁵

Increased risk of seroma formation: Silicone gel implants with a smooth shell may have an increased risk of fluid accumulation between the implant and surrounding tissues, known as seroma. Seroma may require additional drainage or revision procedures for resolution.²⁵

Increased risk of rippling: Rippling is a complication in which visible folds or wrinkles form on the surface of breast implants, which can affect the aesthetic appearance of the breasts. Smooth shell silicone gel implants have a higher risk of rippling compared to textured shell implants.²⁶

Double lumen breast implants: These implants consist of a silicone outer shell and a smaller inner shell that is filled with silicone gel or saline. This double lumen structure is used to provide greater stability and prevent displacement of the filler in the event of rupture.²⁶

Advantages

Safety layers: Double lumen implants are designed with two separate shell layers. The inner layer contains cohesive silicone gel, while the outer layer contains saline. This dual-chamber structure provides an additional layer of safety, since in the event of rupture of the inner shell, the silicone gel is not dispersed into the body, but is contained within the outer shell.²⁶

Volume customization: Dual lumen implants allow volume adjustment during surgery. This means that the plastic surgeon can adapt the size and shape of the breasts according to the patient's preferences and anatomical characteristics, thus achieving a more personalized result.²⁷

Easier rupture detection: In case of rupture of the outer sheath, the saline solution is rapidly absorbed by the body, allowing immediate detection of the rupture. This facilitates diagnosis and decision making for possible revision surgery.²⁸

Reduced risk of capsular contracture: The presence of two layers of sheaths may help reduce the risk of fibrous capsule formation around the implant. Capsular contracture is a complication in which scar tissue contracts and can deform or harden the breast.²⁸

Disadvantages

Possible less natural feeling: Some patients may experience a less natural feeling in the breasts with double lumen implants compared to other types of implants. This is due to the difference in consistency between silicone gel and saline.²⁹

Increased technical complexity: Placement of double lumen implants may require more skill and experience on the part of the surgeon due to the special structure and characteristics of the implant. It is important to choose a plastic surgeon with experience in this type of procedure to minimize risks and obtain optimal results.³⁰

Potential risk of interlayer interaction: Although rare, there is a possibility of interaction between the inner and outer layers of the implant. This may lead to changes in the consistency of the silicone gel or affect the integrity of the outer shell, which may require revision surgery.³¹

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CONCLUSION

In summary, the different types of breast implants available in clinical practice offer varied options for patients seeking to enhance the appearance and volume of their breasts. Each type of implant presents unique advantages and disadvantages that should be carefully considered before making an informed decision.

Saline implants offer the ability to adjust volume during surgery and are less expensive, but may have a less natural feel and a higher risk of wrinkling and rippling.

On the other hand, silicone gel implants are widely used due to their more natural look and feel. Their cohesive consistency provides satisfactory aesthetic results with a lower incidence of wrinkling and rippling, greater durability and less sensitivity to cold. However, detection of ruptures can be more challenging and there is a potential risk of capsular contracture.

Highly cohesive silicone gel implants, known as anatomical implants, mimic the natural shape and projection of the breast. They offer predictable aesthetic results with a lower incidence of capsular contracture and greater resistance to displacement. However, their placement may require longer incisions and their cost may be higher.

Dual lumen implants provide an additional layer of security through two separate sheaths, one internal with cohesive silicone gel and one external with saline. They allow volume adjustment during surgery and offer rapid rupture detection, but may have a less natural feel and greater technical complexity.

Ultimately, the choice of the most appropriate type of breast implant should be based on an individualized assessment of each patient's needs and preferences, as well as the plastic surgeon's experience and recommendations. Open and detailed communication between the patient and the physician is essential to achieve optimal results in breast implant surgery.

It is important to keep in mind that advances in technology and research continue in this field, which may lead to new types of breast implants in the future. Therefore, staying informed about the options available and consulting regularly with trained healthcare professionals is critical to making informed decisions and achieving successful breast implant surgery results.

REFERENCES

- I. Derby BM, Codner MA. Textured silicone breast implant use in primary augmentation: core data update and review. *Plast Reconstr Surg* 2015; 135(1):113-124. doi:10.1097/PRS.0000000000000832.
- II. Maxwell GP, Gabriel A. Breast implant design. *Gland Surg* 2017; 6(2):148-153. doi:10.21037/g.s.2016.11.09.
- III. Gabriel A, Maxwell GP. The evolution of breast implants. *Clin Plast Surg* 2015; 42(4):399-404. doi:10.1016/j.cps.2015.06.015.
- IV. American Society of Plastic Surgeons. Procedural statistics trends 1992-2012. www.plasticsurgery.org/documents/News/Statistics/2012/plastic-surgery-statistics-full-report-2012.pdf. Accessed January 17, 2019.
- V. American Society of Plastic Surgeons. Plastic surgery statistics report 2016. www.plasticsurgery.org/documents/News/Statistics/2016/plasticsurgery-statistics-full-report-2016.pdf. Accessed January 17, 2019.
- VI. Henderson PW, Nash D, Laskowski M, Grant RT. Objective comparison of commercially available breast implant devices. *Aesthetic Plast Surg* 2015; 39(5):724-732. doi:10.1007/s00266-015-0537-1.
- VII. Adams WP Jr, Mallucci P. Breast augmentation. *Plast Reconstr Surg* 2012; 130(4):597e-611e. doi:10.1097/PRS.0b013e318262f607.
- VIII. Spear SL, Jespersen MR. Breast implants: saline or silicone? *Aesthet Surg J* 2010; 30(4):557-570. doi:10.1177/1090820X10380401
- IX. Cronin TD, Gerow FJ. Augmentation mammoplasty: a new "natural feel" prosthesis. In: *Transactions of the Third International Conference of Plastic Surgery: October 13-18, 1963, Washington, DC*.
- X. Maxwell GP, Gabriel A. The evolution of breast implants. *Plast Reconstr Surg* 2014; 134(suppl 1):12S-17S. doi:10.1097/PRS.0000000000000348.
- XI. Hillard C, Fowler JD, Barta R, Cunningham B. Silicone breast implant rupture: a review. *Gland Surg* 2017; 6(2):163-168. doi:10.21037/g.s.2016.09.12.
- XII. Derby BM, Codner MA. Textured silicone breast implant use in primary augmentation: core data update and review. *Plast Reconstr Surg* 2015; 135(1):113-124. doi:10.1097/PRS.0000000000000832.
- XIII. Tugwell P, Wells G, Peterson J, et al. Do silicone breast implants cause rheumatologic disorders? A systematic review for a court-appointed national science panel. *Arthritis Rheum* 2001; 44(11):2477-2484. pmid:11710703.
- XIV. Alpert BS, Lalonde DH. MOC-PS(SM) CME article: breast augmentation. *Plast Reconstr Surg* 2008; 121(suppl 4):1-7. doi:10.1097/01.prs.0000305933.31540.5d
- XV. Hidalgo DA, Spector JA. Breast augmentation. *Plast Reconstr Surg* 2014; 133(4):567e-583e. doi:10.1097/PRS.00000000000000033.
- XVI. ClinicalTrials.gov. Study of the safety and effectiveness of Motiva Implants®.

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- <https://clinicaltrials.gov/ct2/show/NCT03579901>. Accessed January 17, 2019.
- XVII. Establishment Labs. Motiva Implants. <https://motivaimplants.com/whymotiva/innovation-for-enhanced-safety/>. Accessed January 17, 2019.
- XVIII. Sforza M, Zaccheddu R, Alleruzzo A, et al. Preliminary 3-year evaluation of experience with silksurface and velvetsurface Motiva silicone breast implants: a single-center experience with 5813 consecutive breast augmentation cases. *Aesthet Surg J* 2018; 38(suppl 2):S62-S73. doi:10.1093/asj/sjx150.
- XIX. Huemer GM, Wenny R, Aitzetmüller MM, Duscher D. Motiva ergonomix round silksurface silicone breast implants: outcome analysis of 100 primary breast augmentations over 3 years and technical considerations. *Plast Reconstr Surg* 2018; 141(6):831e-842e. doi:10.1097/PRS.00000000000004367
- XX. Lista F, Ahmad J. Evidence-based medicine: augmentation mammoplasty. *Plast Reconstr Surg* 2013; 132(6):1684-1696. doi:10.1097/PRS.0b013e3182a80880. doi:10.1097/PRS.0b013e3182a80880.
- XXI. Namnoum JD, Largent J, Kaplan HM, Oefelein MG, Brown MH. Primary breast augmentation clinical trial outcomes stratified by surgical incision, anatomical placement and implant device type. *J Plast Reconstr Aesthet Surg* 2013; 66(9):1165-1172. doi:10.1016/j.bjps.2013.04.046.
- XXII. Handel N, Garcia ME, Wixtrom R. Breast implant rupture: causes, incidence, clinical impact, and management. *Plast Reconstr Surg* 2013; 132(5):1128-1137. doi:10.1097/PRS.0b013e3182a4c243.
- XXIII. Hölmich LR, Friis S, Fryzek JP, et al. Incidence of silicone breast implant rupture. *Arch Surg* 2003; 138(7):801-806. doi:10.1001/archsurg.138.7.801.
- XXIV. McCarthy CM, Pusic AL, Disa JJ, Cordeiro PG, Cody HS 3rd, Mehrara B. Breast cancer in the previously augmented breast. *Plast Reconstr Surg* 2007; 119(1):49-58. doi:10.1097/01.prs.0000244748.38742.1f
- XXV. Egeberg A, Sørensen JA. The impact of breast implant location on the risk of capsular contraction. *Ann Plast Surg* 2016; 77(2):255-259. doi:10.1097/SAP.0000000000000227.
- XXVI. Wickman M. Rapid versus slow tissue expansion for breast reconstruction: a three-year follow-up. *Plast Reconstr Surg* 1995; 95(4):712-718. pmid:7892316.
- XXVII. Kjølner K, Hölmich LR, Jacobsen PH, et al. Epidemiological investigation of local complications after cosmetic breast implant surgery in Denmark. *Ann Plast Surg* 2002; 48(3):229-237. pmid:11862025.
- XXVIII. Handel N, Jensen JA, Black Q, Waisman JR, Silverstein MJ. The fate of breast implants: a critical analysis of complications and outcomes. *Plast Reconstr Surg* 1995; 96(7):1521-1533. pmid:7480271.
- XXIX. Henriksen TF, Hölmich LR, Fryzek JP, et al. Incidence and severity of short-term complications after breast augmentation: results from a nationwide breast implant registry. *Ann Plast Surg* 2003; 51(6):531-539. doi:10.1097/01.sap.0000096446.44082.60.
- XXX. Fernandes JR, Salinas HM, Broelsch GF, et al. Prevention of capsular contracture with photochemical tissue passivation. *Plast Reconstr Surg* 2014; 133(3):571-577. doi:10.1097/01.prs.0000438063.31043.79.
- XXXI. Wong CH, Samuel M, Tan BK, Song C. Capsular contracture in subglandular breast augmentation with textured versus smooth breast implants: a systematic review. *Plast Reconstr Surg* 2006; 118(5):1224-1236. doi:10.1097/01.prs.0000237013.50283.d2.