Clinical Question:

A 31-year-old healthy female seeking primary submuscular breast augmentation prefers a transaxillary (armpit) incision for scar concealment. She is concerned about whether this approach, compared to the standard inframammary (under-the-fold) incision, significantly increases her 2-year risk of Baker Grade III/IV capsular contracture or Surgical Site Infection (SSI).

Search Question:

Does the transaxillary incision, compared with the inframammary incision, result in a significantly different rate of Baker Grade III/IV capsular contracture or Surgical Site Infection (SSI) in women undergoing primary submuscular breast augmentation at 2-year follow-up?

PICO Question:

P	**I**	**C**	**O**
Women undergoing primary submuscular breast augmentation	Transaxillary incision	Inframammary incision	Baker Grade III/IV Capsular Contracture
Adults			Surgical Site Infection (SSI)
			2-year follow-up

Search Strategy:

Pubmed

- (breast augmentation) AND (transaxillary AND inframammary) AND (capsular contracture OR infection) —> 21
- Filters: 10 years, English —> 6
- (breast augmentation) AND (incision site) AND (Baker Grade) —> 1
- Filters: 10 years —> 0

Cochrane

- transaxillary vs inframammary breast augmentation —> 0

TRIP Database

- (breast augmentation) (transaxillary) (inframammary) (capsular contracture) —> 6 articles
- Filter: Systematic Reviews —> 1

Google Scholar

- (breast augmentation) AND (transaxillary AND inframammary) AND (capsular contracture OR infection)—> 1240
- Filter: 2016-2026 , Review articles—> 87 sort by relevance

For my article selection, I aimed to find studies representing the highest level of evidence available, specifically systematic reviews or meta-analyses. I also felt it was important to prioritize recent data, so I limited my search to studies published within the last 10 years.

Initially, I struggled to find articles that directly compared the two incision modalities. Many studies focused solely on either the transaxillary or inframammary approach rather than evaluating them side by side. When selecting articles, I made sure they included both transaxillary and inframammary incisions. I felt it was acceptable to include studies that also examined periareolar incisions, as long as the two approaches of interest were clearly analyzed.

I attempted to prioritize studies conducted in the United States; however, I found that many were performed in Asia, where the transaxillary method is more commonly used. Although I searched across four databases, I ultimately selected four articles from PubMed and Google Scholar. Another challenge I encountered was accessibility. Because the transaxillary approach is still gaining popularity, several relevant high quality study articles were published in 2025 and 2026, and I did not have access to some of them. This left me with a limited amount of systemic reviews, meta-analysis and RCT to choose from. The articles available through TRIP and Cochrane were either too specific or did not adequately address my research question. While Google Scholar is not always considered the most rigorous source, it allowed me to identify a broader range of studies, which I then verified for credibility and publication quality.

Article 1

Capsular Contracture Rate After Breast Augmentation with Periareolar Versus Other Two (Inframammary and Transaxillary) Incisions: A Meta-Analysis

Li, Shangshan ; Chen, Lin ; Liu, Wenyue ; Mu, Dali ; Luan, Jie

Aesthetic plastic surgery, 2018-02, Vol.42 (1), p.32-37

Citation:

Li, S., Chen, L., Liu, W., Mu, D., & Luan, J. (2018). Capsular contracture rate after breast augmentation with periareolar versus other two (inframammary and transaxillary) incisions: A meta-analysis. Aesthetic Plastic Surgery, 42, 32–37. https://doi.org/10.1007/s00266-017-0965-1

Abstract

Background

Capsular contracture has been the most common complication of cosmetic breast augmentation. The effect of incision pattern on capsular contracture is still unclear. This meta-analysis demonstrates current evidence with regard to the comparison of capsular contracture rate between periareolar and other two (transaxillary and inframammary) incisions.

Methods

PubMed, EMBASE, and Cochrane databases were searched up to January 2017. The results of selected studies were meta-analyzed to obtain a pooled odds ratio of the effect of periareolar versus other two incision patterns (transaxillary or inframammary incision) of breast augmentation on capsular contracture rates. In addition, subgroup analyses were performed on periareolar versus transaxillary groups and periareolar versus inframammary groups with regard to capsular contracture rate.

Results

Seven comparative studies were selected and meta-analyzed. Five of the seven studies reported a higher rate of capsular contracture on patients with periareolar incisions. The results showed a significantly higher rate of capsular contracture with periareolar incisions compared with other two incisions (OR, 1.83; 95% CI, 1.06–3.15, p = 0.03). Subgroup results showed no significant difference of capsular contracture between periareolar incisions and transaxillary incisions (OR, 0.94; 95% CI, 0.52–1.64, p = 0.79) and showed a significantly higher rate of capsular contracture in periareolar incisions compared to inframammary incisions (OR, 1.91; 95% CI, 1.06–3.43, p = 0.03).

Conclusion

The results of this meta-analysis demonstrate the contributing effects of periareolar breast augmentation on the rate of capsular contracture. However, more studies with longer tracking periods and higher quality should be conducted to further verify this conclusion.

Article 2

Controllable Factors to Reduce the Rate of Complications in Primary Breast Augmentation: A Review of the Literature

Montemurro, Paolo ; Hedén, Per ; Behr, Björn ; Wallner, Christoph

Aesthetic plastic surgery, 2021-04, Vol.45 (2), p.498-505

Citation

Montemurro, P., Hedén, P., Behr, B., & Wallner, C. (2021). Controllable factors to reduce the rate of complications in primary breast augmentation: A review of the literature. Aesthetic Plastic Surgery, 45, 498–505. https://doi.org/10.1007/s00266-020-01726-x

Abstract

Background

Aesthetic augmentation mammoplasties are one of the most demanded procedures performed in the aesthetic surgical sector. Because of the high epidemiological impact, the evaluation of measures to reduce the risk of complications is highly needed. The goal of this review is to evaluate the current literature for successful actions to reduce the risk of complications in aesthetic breast augmentation.

Methods

We searched Medline-listed journals for “complications primary breast augmentation” and defined surgeon-dependent and patient-dependent factors within those.

Results

Most of the strategies to reduce the risk of any complication are based on meticulous hygienic precautions and adequate training of the surgeon. The current literature suggests complications such as capsular contracture, infection and BIA-ALCL are closely linked with bacterial contamination and therefore can be avoided with different hygienic measures.

Article 3

Surgical Trauma Comparison of Inframammary Fold versus Endoscopic Transaxillary Approaches in Breast Augmentation: A 7-Year Cohort Study

Chen, Zhaoyu ; Qiu, Zhao ; Tong, Jing ; Yang, Jie ; Luo, Chao ; Jiang, Wenbin ; Wang, Rongrong ; Sun, Jiaming

Aesthetic plastic surgery, 2025-09, Vol.49 (18), p.5169-5175

Citation

Chen, Z., Qiu, Z., Tong, J., Yang, J., Luo, C., Jiang, W., Wang, R., & Sun, J. (2025). Surgical trauma comparison of inframammary fold versus endoscopic transaxillary approaches in breast augmentation: A 7-year cohort study. Aesthetic Plastic Surgery, 49, 5169–5175. https://doi.org/10.1007/s00266-024-04619-5

Abstract

Background

This retrospective cohort study aimed to assess differences in surgical trauma between the inframammary fold approach and endoscopic transaxillary approach in breast augmentation surgery.

Methods

One hundred and ninety-four patients who underwent breast augmentation using either an inframammary fold or endoscopic transaxillary approach were enrolled. All procedures were primary and bilateral cases. Patients' demographics and indicators, such as operation duration, postoperative volume of drainage, drainage duration, length of hospital stay, and postoperative pain scores, were observed and analyzed.

Results

One hundred and five patients underwent inframammary fold incisions, while the remaining 89 received transaxillary incisions. The operation duration was significantly shorter in the inframammary fold group than in the transaxillary group, while the VAS scores were significantly lower ($p < 0.001$). Similarly, differences in the age and fertility status between the two groups were statistically significant ($p < 0.05$). However, no statistically significant differences were noted in the scores of the remaining indicators ($p < 0.05$).

Conclusions

This research demonstrated that while patients in the endoscopic transaxillary group were typically younger, which is commonly hypothesized to result in superior results, the inframammary fold approach may offer a surgical option with reduced trauma and pain and concomitantly greater convenience and efficiency, yielding high satisfaction levels among Chinese women.

Article 4

Endoscopic Transaxillary Versus Inframammary Approaches for Breast Augmentation Using Shaped Implants: A Matched Case–Control Study

Dong Won Lee, Soo Jung Kim, Hanjo Kim

Citation

Lee, D. W., Kim, S. J., & Kim, H. (2019). Endoscopic transaxillary versus inframammary approaches for breast augmentation using shaped implants: A matched case-control study. Aesthetic Plastic Surgery, 43, 563–568. https://doi.org/10.1007/s00266-019-01324-6

Abstract

Purpose

The incision for breast augmentation can be chosen from the transaxillary, inframammary fold, periareolar, or transumbilical approaches. While the inframammary fold approach is commonly used worldwide, the transaxillary approach is more popular in Asia due to the more conservative location of the scar. In this study, we performed augmentation mammoplasty using anatomically shaped implants via the endoscopic transaxillary and inframammary fold incisions and compared the outcomes.

Methods

Three hundred sixty-four patients who underwent breast augmentation with shaped implants were enrolled. All were primary and bilateral cases. In total, 728 shaped implants were used. Patients' demographics, incision type, and complications were documented. Complications such as capsular contracture, hematoma, infection, implant malposition, wound problem, and chronic seroma were observed during the average 27 months of follow-up period and analyzed.

Results

One hundred ninety-five patients underwent augmentation mammoplasty via the inframammary approach, whereas 169 patients underwent the endoscopic transaxillary approach. Implant type and size were matched between the two groups. Complication rates were 1.8% and 2.7% in the inframammary and transaxillary approach, respectively. There was no significant difference between the two approaches in terms of surgical complications ($p = 0.593$).

Conclusion

This study demonstrates that the endoscopic transaxillary approach is not inferior to the inframammary approach when shaped implants are used for augmentation mammoplasty. Therefore, the transaxillary approach may be an alternative method when using shaped implants for augmentation mammoplasty, especially for women who wish to avoid a visible scar on the inframammary fold.

Foreign Considerations for Included Studies

Chen Z, et al. (2025)

China

- **Cultural Context**: In China, a conservative approach to scar placement is highly prioritized to avoid visible marks on the breast, leading more than half of women to prefer the axillary approach. This cultural modesty may lead surgeons to perform higher volumes of transaxillary surgeries, potentially increasing their technical proficiency and lowering complication rates compared to US surgeons who primarily use the IMF approach.
- **Social Context**: The study cohort had an average BMI of 19.44, which is significantly lower than the average US patient population. This may result in lower skin tension at the incision site and potentially different wound-healing characteristics. Furthermore, the transaxillary group was significantly younger and more likely to be nulliparous than the IMF group.
- **Economic Context**: The average length of hospital stay was over 7 days (7.41 for IMF and 7.75 for Axillary). This reflects a healthcare system where patients are monitored in an inpatient setting for significantly longer than the standard US outpatient model, which could contribute to the early detection and prevention of Surgical Site Infections (SSI).
- **Language**: The study was published in English, but authored by researchers from Wuhan, China. Because the outcomes (Baker Scale and VAS) are standardized international metrics, the risk of interpretation bias due to translation is low.

Li S, et al. (2018)

Global Meta-Analysis

- **Note on SR/Meta-Analysis**: This meta-analysis synthesized data from both the USA and Spain. I included this evidence because it provides a massive sample size (N=17,113) that allows for more robust statistical power in comparing incision types. Spanish studies (Ruiz et al.) were included, which align with Mediterranean aesthetic standards similar to the US, where longer follow-up (5 years) is utilized to assess capsular contracture.

Lee DW, et al. (2019)

South Korea

- **Cultural Context**: Similar to the Chinese study, South Korean patients prioritize a "conservative location of the scar". The "myth" that anatomically shaped implants are difficult to insert via the axilla is addressed here, showing that cultural preference drives surgical innovation in the transaxillary approach.
- **Social Context**: Asian patients are noted to be prone to hypertrophic and prolonged hyperemic scarring. This social/genetic factor makes the IMF scar less acceptable to this

population, potentially skewing "satisfaction" data compared to a US population where IMF scars may heal more inconspicuously.

- **Economic Context**: This research was conducted at a high-volume private plastic surgery center in Seoul. The financial incentive for patient satisfaction in a highly competitive aesthetic market may lead to a higher emphasis on scar concealment techniques.
- **Language**: Standardized medical terminology and the 14-point plan for infection prevention were used, ensuring that the results are generalizable to Western clinical practice.

Author (Date),	**Level of Evidence**	**Sample/Setting (# of subjects/ studies, cohort definition etc)**	**Outcome(s) studied**	**Key Findings**	**Limitations and Biases**
Li S, et al. (2018)	eta-Analysi	- 7 comparative studies (3 prospective, 4 retrospective - Total sample: 17,113 subjects/implants - 2,519 Periareolar; 14,594 non-periareolar (IMF/Axillary) - Studies conducted in USA and Spain	- Rate of capsular contracture (Baker III/IV) - Follow-up range: 8 months to 10 years	Periareolar had higher contracture rate than combined others (7.2% vs 3.1%, OR 1.83, p=0.03). - No significant difference between Periareolar and Transaxillary (OR 0.94, p=0.79). - Significantly higher rate in Periareolar vs IMF (OR 1.91, p=0.03).	- High heterogeneity (I^2 = 78%) due to multifactorial variables like follow-up length, pocket location, and implant type. - No RCTs were included; all selected studies were comparative/observational.

					- Only English language publications were selected.
Montemurro P, et al. (2021)	Literature Review	- Reviewed 179 Medline-listed articles; 74 articles met full inclusion criteria - Focused on surgeon-dependent and patient-dependent factors	Complications: Capsular contracture, infection, BIA-ALCL, seroma, rotation, satisfaction	- **Incision Comparison:** Cites Jacobson et al. (183 patients) where transaxillary incisions had the highest contracture (6.4%), followed by periareolar (2.4%) and inframammary (0.5%). - **Infection Risk:** Notes that transaxillary and periareolar approaches provide a higher rate of infection, likely due to more contaminated areas around the incision, which can theoretically lead to higher contracture. - **Positioning:** Suggests IMF allows better visual fields and easier positioning into the pocket compared to transaxillary. - Cites Calobrace et al. showing periareolar incision as a risk factor for contracture (OR 2.2).	- High degree of author-reported conflict of interest (consultants/speakers for Allergan). - Scientific basis for some aseptic strategies (like nipple shields) noted as not yet solid.
Chen Z, et al. (2025)	Cohort Study	- 194 Chinese patients; 105 IMF, 89 Transaxillary	- Surgical trauma indicators (Op duration, drainage	- **Operation duration** was significantly shorter in the IMF group (125.57 min) compared to the	- Retrospective design rather than randomized

		- Primary bilateral cases; textured silicone gel implants (Mentor), dual-plane placement - Data collected between Jan 2017 and Dec 2023 - Average Age: IMF 32.70 years; Axillary 28.83 years	volume/duration, hospital stay) - Postoperative pain (VAS) - Satisfaction at 1 year - Serious complications: infection and capsular contracture (Baker III/IV) **Tools Used:** - Visual Analog Scale (VAS) for pain	Transaxillary group (164.17 min) ($p<0.001$). - **Pain scores (VAS)** were significantly lower in the IMF group at days 1, 2, and 3 postoperatively ($p<0.001$). - **Satisfaction levels** were high in both groups (91 satisfied in IMF; 79 in Axillary) with no significant difference ($p=0.676$). **Complications:** No serious complications, such as infection or Baker III/IV capsular contracture, were observed in either group throughout the 7-year study period.	controlled trial (RCT). - Statistically significant differences in age and fertility between groups; the transaxillary group was younger ($p<0.01$) and more likely to be nulliparous ($p<0.05$), which may influence healing or preference.
Lee DW, et al. (2019)	Matched Case-Control Study	- 364 Korean patients (728 implants); 195 IMF, 169 Transaxillary - All primary bilateral cases; textured shaped implants (Allergan 410), subpectoral pocket - Mean follow-up: 26.5 months	- Complication rates: capsular contracture, hematoma, infection, malposition, wound problems, chronic seroma **Tools Used:** - Baker scale (Grades III and IV)	- **Complication rates** were 1.8% in the IMF approach and 2.7% in the Transaxillary approach, which was not significantly different ($p=0.593$). - **Capsular contracture** specifically occurred in 1.78% of the transaxillary group and 1.03% of the inframammary group ($p=0.386$).	- Retrospective study design. - Single-surgeon experience may limit generalizability to surgeons with less endoscopic experience. - Follow-up period was just over 2 years; longer tracking may be needed as

			- Ultrasonography for rotation/malpositio n	- **Infection:** Zero cases of infection or chronic seroma occurred in either group. - **Malposition:** One case (0.3%) of malrotation occurred in the transaxillary group; zero in IMF (p=0.282). - Concluded the endoscopic transaxillary approach is not inferior to IMF even when using anatomically shaped implants.	contracture increases over time.

Conclusion(s):

Chen et al. concluded that while the endoscopic transaxillary approach is a popular choice for concealment, the inframammary fold (IMF) approach resulted in significantly reduced surgical trauma, shorter operative times, and lower postoperative pain levels. Notably, they found zero cases of Baker Grade III/IV capsular contracture or surgical site infection (SSI) in either group throughout their study.

Li et al. concluded that the choice of incision pattern does have a contributing effect on the rate of capsular contracture. Their meta-analysis found that periareolar incisions had a significantly higher rate of contracture compared to inframammary incisions. However, they concluded there was no significant difference in contracture rates when specifically comparing periareolar to transaxillary incisions. This then can be help us infer that if the transaxillary has the same risk level as the periareolar, and the periareolar is statistically worse than the IMF, then by extension, the transaxillary incision also performed worse than the IMF incision in this data set.

Lee et al. concluded that the endoscopic transaxillary approach is not inferior to the inframammary approach regarding complications. Their study found that complication rates, specifically capsular contracture (1.78% (transaxillary vs. 1.03% IMF) and infection (0% in both), showed no statistically significant difference between the two surgical approaches.

Montemurro et al. concluded that while some studies suggest the inframammary incision has the lowest rates of infection and capsular contracture, there is no unanimous consensus across the literature. They emphasized that complications like infection and contracture are more closely linked to meticulous hygienic precautions and surgeon training than to the incision site alone.

My overall conclusion based off of these 4 studies is that there is no statistically significant difference between transaxillary and inframammary incisions when it comes to the long-term risk of Baker Grade III/IV capsular contracture or SSI. While some studies suggest a slight trend toward lower complications with the IMF approach, the evidence is not significant enough to conclude that the transaxillary approach is "unsafe". However, the IMF approach is consistently superior in terms of immediate postoperative recovery, including less pain and trauma.

Clinical Bottom Line:

I will weigh my studies in the following order: Li et al., Chen et al., Lee et al., and lastly Montemurro et al.

I weighed the Li et al. study highest as it was the only study that was a systematic review and meta-analysis, providing the highest level of evidence by pooling data from over 17,000 implants. I liked how they performed subgroup analyses to specifically compare incision types. A weakness was the high heterogeneity in the study pool and the lack of included RCTs, but this is a common limitation in surgical literature.

I weighed the Chen et al. article 2nd as it was the most recent study (2025) and provided extremely detailed data on surgical trauma and pain scores. I liked that it followed a consistent cohort over 7 years, which is a significant duration for observing Baker Grade III/IV outcomes. A limitation was that it was a retrospective study and the transaxillary group was significantly younger, which could impact the generalizability of the healing results.

Next was the Lee et al. study. I liked how they matched the cases by implant type and size to isolate the incision as the primary variable. It was particularly relevant as it used modern, anatomically shaped implants. The weakness of this study was that it was a single-surgeon retrospective study, which may reflect that surgeon's specific expertise rather than a universal outcome.

Last is the Montemurro et al. article. I weighed this last because it was a literature review rather than original research or a systematic meta-analysis. While it provided a comprehensive overview of risk factors, many of the conclusions were based on epidemiological findings rather than direct causal evidence. I also noted a potential for bias as the lead authors disclosed consultant roles for an implant manufacturer.

Magnitude of any effects:

At this point, I don’t believe the effect of the incision site on contracture or SSI is high, as the majority of high-level evidence found no statistical difference between the two modalities.

Clinical significance (not just statistical significance):

Based off of the findings in these articles, I would say that while both incisions are safe regarding major complications, the clinical significance lies in the **patient’s recovery**

experience and aesthetic goals. If a patient prioritizes a faster, less painful recovery, the IMF incision is clinically significant. However, if a patient's quality of life is heavily dependent on scar concealment, as seen in the Asian cohorts, the transaxillary approach is a clinically significant alternative.

I agree with the authors who stated that patients should be more involved in determining which modality to use if there is no significant difference in safety outcomes. By presenting our patients with the trade-offs, shorter op time and less pain (IMF) versus hidden scarring (Axillary), we allow them to make a more informed decision about their treatment.

Any other considerations important in weighing this evidence to guide practice:

It will be important for future studies to include more randomized controlled trials (RCTs) to clearly determine a cause-and-effect link between incision and contracture, as most current data is observational. I also think future research needs to standardize the use of the "14-point plan" or similar hygienic protocols across both groups to ensure that "contamination" isn't a confounding variable when comparing the two sites.