BSAPS Journal
ISSN (e): 2958-6208; ISSN (p): 2958-6194
Volume 3; Issue 2 (July-December 2022)
OPEN ACCESS
jbsaps.com

Periareolar Approach for Aesthetic Breast Surgery: Historical Aspects and Evolution

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Original Research Article **Abstract:** **DOI:**

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The periareolar approach has emerged as a fundamental technique in aesthetic and reconstructive breast surgery, owing to its ability to minimize visible scarring while preserving natural breast contour. This literature review traces the evolution of the periareolar approach from its early development to its current applications in oncoplastic and nipple-sparing surgeries. Early iterations of the technique focused on addressing breast ptosis and hypertrophy, with significant advancements such as the introduction of the "round block" technique and the integration of suction-assisted lipectomy. The use of advanced materials, including acellular dermal matrices (ADMs), has further enhanced the effectiveness of the periareolar approach, particularly in complex reconstructive procedures. Comparative studies indicate that while the periareolar approach is associated with some risks, including potential scar widening and flattening of the breast cone, these challenges can often be mitigated through careful patient selection and adjunctive techniques. The approach has shown high levels of patient satisfaction, particularly in oncoplastic and nipple-sparing mastectomies, making it a valuable tool in the surgeon's repertoire. As the periareolar approach continues to evolve, future research should aim to optimize its outcomes through further refinement and technological integration, ensuring its continued relevance in modern breast surgery.

Keywords: PeriareolarApproach, Aesthetic Breast Surgery, Mastopexy, Reduction Mammoplasty, Scar Minimization, Breast Contouring.

|| BSAPS Journal || **Publication History** - Received: 16.08.2022 || Revised: 08.10.2022 || Accepted: 15.11.2022 || Published: 25.12.2022 ||

INTRODUCTION

The periareolar approach has established itself as a pivotal technique in the realm of aesthetic breast surgery, emerging from a rich historical backdrop that highlights its evolution from a mere reconstructive method to a preferred choice for cosmetic enhancement and oncological procedures. Introduced by Hollander in 1924, the periareolar incision was initially conceived as a means to access breast tissue with minimal visible scarring, thereby addressing one of the primary concerns in aesthetic surgeries.[1] Over the decades, this approach has undergone significant refinements, reflecting the broader evolution of breast surgery techniques from highly invasive methods to more conservative, minimally invasive approaches designed to optimize both functional and cosmetic outcomes.[2] The transition from radical mastectomies and extensive resections to techniques like the periareolar approach mirrors the growing importance of aesthetic outcomes in breast surgery. Patient expectations have progressively shifted, with an increasing emphasis on not just survival and oncological safety but also on the quality of life post-surgery. Aesthetic considerations have become paramount, particularly in an era where breast cancer survivors seek not only to be disease-free but also to retain or regain their sense of femininity and body image.[3] This dual focus on oncological safety and aesthetic excellence has driven surgeons to adopt and refine techniques that minimize scarring, maintain breast symmetry, and support long-term structural integrity, all while ensuring comprehensive disease management.[4] The development of the periareolar approach has been significantly influenced by the contributions of key surgeons and institutions. Innovations such as the periareolar augmentation mastopexy (PAM) and the integration of acellular dermal matrices (ADMs) in reconstructive procedures underscore the technique's adaptability and its potential to improve both aesthetic and functional outcomes. For instance, the double-skin technique with mesh support, as detailed in the work by Góes, has enhanced the stability and longevity of breast shape post-surgery, effectively reducing complications such as scar visibility and breast cone flattening.[5,6] These advancements have broadened the application of the periareolar approach beyond purely aesthetic procedures to include complex reconstructive surgeries like oncoplastic breast-conserving therapy (BCT), where maintaining cosmetic integrity is crucial.[7]The integration of the periareolar approach into oncoplastic surgery represents a significant milestone in the technique's evolution. Oncoplastic surgery, which combines oncological and aesthetic principles, has benefited immensely from the periareolar incision's ability to facilitate tumor resection while preserving the natural contour and appearance of the breast. Studies have

demonstrated that the periareolar approach, when used in conjunction with oncoplastic techniques, yields high levels of patient satisfaction and favorable aesthetic outcomes, making it a preferred method in breast-conserving surgeries.[8] The work by Klinger et al. has shown that this approach can be effectively adapted to various tumor locations and resection volumes, offering a versatile solution that balances oncological needs with cosmetic desires.[7] In recent years, the periareolar approach has seen further refinements, particularly in its application to nipple-sparing mastectomies (NSM) and the incorporation of advanced materials like ADMs. The use of ADMs in conjunction with the periareolar incision has revolutionized implant-based breast reconstruction, providing enhanced support and reducing the risk of complications such as capsular contracture and implant displacement.[9] For example, the prepectoral implant placement technique, which involves complete coverage of the implant with porcine ADM, has been lauded for its ability to maintain breast projection and minimize visible deformities, offering a significant improvement over traditional subpectoral methods.[10] However, the introduction of these advanced materials has also sparked debates within the surgical community regarding the optimal techniques and the long-term outcomes associated with their use. While some studies highlight the benefits of ADM-assisted reconstructions, others caution against potential complications, such as increased rates of seroma and wound healing issues, particularly in patients with prior radiation therapy.[11] Despite these advancements, the periareolar approach is not without its challenges. Complications such as scar quality, breast cone flattening, and long-term stability remain areas of concern. The literature reveals a range of complication rates associated with this technique, underscoring the need for careful patient selection and meticulous surgical execution. For instance, studies have reported varying rates of nipple necrosis and implant loss in NSM procedures using the periareolar incision, with some suggesting that patient factors such as smoking and high body mass index may exacerbate these risks.[12] Moreover, the long-term outcomes of ADM-assisted reconstructions continue to be scrutinized, with some research indicating a potential for increased complication rates in single-stage reconstructions compared to two-stage procedures.[13] In conclusion, the periareolar approach has evolved into a cornerstone technique in breast surgery, offering a blend of oncological safety and aesthetic excellence that meets the rising expectations of patients. Its development has been marked by significant innovations and a growing body of research that continues to refine its application and outcomes. However, as with any surgical technique, ongoing evaluation and adaptation are necessary to address the challenges and optimize the benefits for patients.

Methods

This comprehensive literature search was conducted across multiple databases, including PubMed, Google Scholar, and MEDLINE. The search strategy included keywords such as "periareolar approach," "breast surgery," "mastopexy," "reduction mammaplasty," "nipple-sparing mastectomy," "oncoplastic surgery," "acellular dermal matrices," and "double-skin technique." Only peer-reviewed, open-access, and English-language articles were considered for inclusion to ensure the accessibility and relevance of the findings. The inclusion criteria for the selected studies were based on their focus on the periareolar approach, its technological and procedural innovations, and its application in both aesthetic and reconstructive breast surgeries. Studies that provided historical insights, discussed key innovations, detailed surgical techniques, and analyzed patient outcomes and complications were prioritized. The exclusion criteria involved studies not available in English, those published outside the specified timeframe, and articles that did not directly relate to the periareolar approach or its specific advancements in breast surgery. Once the relevant literature was identified, a chronological framework was employed to organize the data. This framework allowed for the systematic tracing of the development, refinement, and global adoption of the periareolar approach, highlighting significant milestones and innovations. The collected data were analyzed to identify common themes, advancements, and ongoing debates within the surgical community. The findings were then synthesized to provide a comprehensive overview of the periareolar approach's evolution, its current applications, and its impact on patient outcomes and satisfaction.

Literature Review

The periareolar approach in breast surgery has evolved significantly since its inception, becoming a cornerstone technique in both aesthetic and reconstructive procedures. This evolution has been marked by a series of innovations and refinements that have expanded the utility and effectiveness of the approach, addressing early challenges such as scarring and the need for stable, long-term aesthetic outcomes.

Early Development and Initial Challenges (1920s - 1980s)

The foundation of the periareolar approach can be traced back to the early 20th century, with Biesenberger's 1921 report on reduction mammaplasty, which involved wide separation of the breast skin from the gland and significant glandular resection. This method allowed for extensive tissue excision based on the patient's anatomy, setting a precedent for the wide undermining techniques that would later be incorporated into the periareolar approach.[14] However, this early technique was primarily focused on functionality rather than aesthetics, and it posed challenges such as increased risk of nipple-areola necrosis due to extensive tissue manipulation.[15–18]The first significant application of a periareolar incision in modern breast surgery was introduced by J. Andrews in 1975, who described a method for breast reduction and mastopexy using blunt dissection of the breast from the skin, combined with a mastopexy performed with unabsorbable sutures attached to the pectoralis muscle and periosteum of the rib.[19] This approach sought to address the challenges of breast ptosis and hypertrophy, focusing on the dual goals of functional improvement and aesthetic enhancement. However, early

applications of the periareolar technique were limited by issues such as visible scarring and difficulty in maintaining the breast's shape over time. In 1976, R. Bartels introduced a mastopexy technique based on the simple circumferential excision of skin around the areola. This method was specifically indicated for correcting mild to moderate ptosis, making it a more conservative approach compared to earlier methods.[20] While this technique was simpler and less invasive, it still faced challenges related to scar visibility and the long-term stability of the breast shape.A major advancement occurred in 1985 when R. Bustos utilized a periareolarmammaplasty procedure employing a trilobed flap with an inferior pedicle fixed to the thoracic wall using a silicone sheet. This innovation provided greater structural support to the breast, reducing the risk of postoperative complications such as breast sagging and loss of shape.[21] Bustos' technique marked an important step forward in the refinement of the periareolar approach, emphasizing the importance of maintaining the breast's structural integrity while minimizing scarring.

Refinement and Expansion (1980s - 1990s)

The periareolar approach continued to evolve through the 1980s, with several key innovations that expanded its application in aesthetic breast surgery. In 1988, L. Benelli introduced the "round block" technique, which utilized a circular nonabsorbable stitch of woven nylon included in the periareolar suture.[22] This technique significantly reduced the risk of postoperative enlargement or distortion of the areola, particularly in cases involving severe mammary ptosis or hypertrophy. Benelli's method allowed for large cutaneous excisions while maintaining the integrity of the areola, making it a highly versatile approach for various types of breast surgeries.Building on Benelli's work, L. Toledo proposed in 1989 a combination of the periareolar approach with suction-assisted lipectomy (using a 6-mm cannula) for the treatment of small or medium hypertrophies and varying degrees of ptosis.[23] This innovation further minimized scarring and allowed for better contouring of the breast, addressing one of the major limitations of earlier techniques. Toledo's method demonstrated the increasing emphasis on achieving both aesthetic and functional outcomes in breast surgery.In the early 1990s, further refinements were made to enhance the cosmetic outcomes of the periareolar approach. P. Martins in 1991 reported a mammaplasty technique that employed two transpositional breast flaps: one superior, carrying the areolar-nipple unit, and one inferior, used to shape a glandular pad acting as a breast prosthesis.[24] This technique provided improved breast projection and shape while maintaining the blood supply to the nipple-areola complex, addressing a key concern in breast surgery.Simultaneously, Y. Felicio in 1991 introduced a periareolar approach for reduction mammaplasty and mastopexy that focused on sculpting a broad central pedicle with excellent nerve and blood supply to the nipple-areola complex.[25] This method involved glandular resection in all four breast quadrants, leaving the central portion of the mammary gland untouched. Felicio's technique, which was applied to over 600 patients with good aesthetic results, highlighted the growing importance of preserving the nipple-areola complex's function while achieving desirable cosmetic outcomes.By the mid-1990s, the periareolar approach had gained widespread acceptance and was being adapted globally. E. Auclair and V. Mitz in 1993 published their experience with a modified Bustos technique, treating breast ptosis with or without hypertrophy in 38 patients. Their modification included a wide deep subcutaneous dissection over the entire surface of the gland and the insertion of an absorbable mesh onto the anterior glandular surface. This technique avoided leaving nonabsorbable elements in the breast, reducing the risk of complications associated with foreign bodies.[26] The use of absorbable materials like Polyglactin 910 in this context represented a significant advancement in the refinement of the periareolar approach.

Technological and Procedural Innovations (1990s - Early 2000s)

The late 1990s and early 2000s saw the introduction of several technological and procedural innovations that further enhanced the effectiveness and applicability of the periareolar approach. One of the most significant advancements was the introduction of the double-skin technique with mesh support by Góes in 2002. This technique addressed issues of scar visibility and breast shape stability by providing additional support to the breast structure, thereby improving long-term outcomes.[5] The double-skin technique quickly became a popular method in both aesthetic and reconstructive breast surgeries, as it allowed for more predictable and consistent results.Concurrently, the integration of the periareolar approach into oncoplastic surgery marked a significant milestone in its evolution. Oncoplastic surgery, which combines oncological and aesthetic principles, benefited immensely from the periareolar incision's ability to facilitate tumor resection while preserving the natural contour of the breast. Studies have shown that the periareolar approach, when used in conjunction with oncoplastic techniques, yields high levels of patient satisfaction and favorable cosmetic outcomes, making it a preferred method in breast-conserving surgeries.[26] This integration underscored the versatility of the periareolar approach, as it could be adapted to meet the dual demands of cancer treatment and cosmetic enhancement.Another major innovation during this period was the introduction of advanced materials such as acellular dermal matrices (ADMs) in breast surgery. ADMs, derived from human or animal tissue, provide structural support to the breast and help reduce complications associated with implant-based reconstructions. The use of ADMs in conjunction with the periareolar approach, particularly in nipple-sparing mastectomies (NSM), has become increasingly popular due to its ability to enhance both the aesthetic and functional outcomes of the procedure.[27] These materials have significantly improved patient satisfaction and have become a standard component in modern breast reconstruction techniques.

Contemporary Applications and Emerging Trends (2000s - Present)

In recent years, the periareolar approach has continued to evolve, with a particular focus on its application in NSM. The combination of the periareolar approach with ADM and prepectoral implant placements has gained widespread acceptance, as it offers excellent cosmetic results with minimal complications. Studies have demonstrated that this approach provides high levels of patient satisfaction and long-term stability, making it a preferred choice for both surgeons and patients.[9] Despite these advancements, ongoing debates within the surgical community highlight the need for continued research and refinement. Discussions surrounding the optimal use of ADMs, the choice between single-stage and two-stage reconstructions, and the management of complications such as ischemia and necrosis remain central to the evolution of the periareolar approach.[28] These debates reflect the dynamic nature of breast surgery, as surgeons continue to explore new techniques and materials that can further enhance the outcomes of the periareolar approach.Global variations in the adoption of the periareolar approach also continue to shape its evolution. Different regions have developed unique preferences for surgical techniques, influenced by cultural, anatomical, and healthcare system differences. For instance, the use of prepectoral implant placement in conjunction with the periareolar approach has gained traction in some regions due to its less invasive nature and reduced recovery times.[29] However, the adoption of these techniques varies widely, with some regions still preferring more traditional approaches due to differences in training, resources, and patient expectations.In conclusion, the periareolar approach has evolved from a relatively simple method for minimizing scarring to a versatile and highly effective technique in both aesthetic and reconstructive breast surgery. The continuous refinement of this approach, driven by innovations in surgical technique and the incorporation of advanced materials, has significantly improved patient outcomes and satisfaction. As the periareolar approach continues to evolve, it will undoubtedly remain a key component of breast surgery, offering patients a balance of oncological safety and aesthetic excellence.

Discussion

The evolution and application of the periareolar approach in breast surgery have been thoroughly explored in this manuscript, and the findings are supported by a wealth of literature that highlights both the strengths and challenges of this technique. The periareolar approach, first introduced in the early 20th century and significantly refined over subsequent decades, remains a versatile and effective method for various breast surgeries, including mastopexy, augmentation, reduction, and oncoplastic procedures.One of the primary advantages of the periareolar approach is its ability to minimize visible scarring while maintaining a natural breast contour. Studies have consistently shown high levels of patient satisfaction with the aesthetic outcomes of this technique. For instance, Klinger et al. (2021) reported excellent results in a large series of over 5000 procedures, demonstrating the periareolar approach's effectiveness across multiple breast conditions, including mastopexies and oncoplastic surgeries. The study highlighted the technique's adaptability, noting that when applied to the correct patient population, it yields low complication rates and high patient satisfaction.[1] This finding is echoed by Okumuş (2021), who found that the use of short-scar incisions mimicking breast augmentation incisions through a periareolar approach resulted in excellent aesthetic outcomes and very high patient satisfaction, further reinforcing the utility of this approach in breast-conserving surgeries.[30] However, the periareolar approach is not without its challenges. One of the most significant issues reported in the literature is the potential for complications such as areolar distortion, widening of the periareolar scar, and flattening of the breast cone over time. Fayman et al. (2003) identified these issues in their comparison of periareolar breast reduction to vertical scar techniques, noting that while periareolar reduction often achieved better initial aesthetic results, it was associated with higher dissatisfaction regarding scar quality over the long term.[31] This highlights the need for careful patient selection and the potential benefits of combining the periareolar approach with other techniques or materials, such as acellular dermal matrices (ADMs), to enhance structural support and minimize scarring.In oncoplastic surgery, the periareolar approach has been shown to be particularly beneficial, providing a balance between oncological safety and cosmetic outcomes. Klinger et al. (2016) reported that the periareolar incision in oncoplastic breast-conserving surgery allowed for wide glandular resections while preserving breast aesthetics, resulting in high levels of patient satisfaction.[7] Similarly, a systematic review by Lisboa et al. (2024) comparing breast-conserving surgery with and without oncoplastic techniques found that while oncoplastic surgery provided improved aesthetic outcomes, patient satisfaction levels were similar when adjusted for tumor staging and location, suggesting that the periareolar approach can be an effective tool in achieving these outcomes.[32]Moreover, the periareolar approach's integration into nipple-sparing mastectomy (NSM) has further expanded its applications. Seki et al. (2020) demonstrated that the periareolar incision provided comparable outcomes to the inframammary fold incision in NSM, with the added benefit of improved cosmetic results. This study supports the use of the periareolar technique in reconstructive surgeries, particularly when aesthetic outcomes are a priority.[33] This finding is consistent with those of El HageChehade et al. (2017), who reported that NSM via a hemi-periareolar incision was oncologically safe and yielded high patient satisfaction, with low complication rates.[34]In contrast, the comparative analysis of risk factors and outcomes in direct-to-implant (DTI) and two-stage prepectoral breast reconstruction by Casella et al. (2019) suggests that while the periareolar approach is effective, its success is closely linked to patient-specific factors such as body mass index (BMI) and the use of radiotherapy. This study found that lower BMI and the absence of radiotherapy were associated with better outcomes in patients undergoing DTI reconstruction via a periareolar incision.[35] This highlights the importance of careful patient selection and individualized treatment planning when using the periareolar approach in complex reconstructions.In summary, the periareolar approach continues to be a valuable technique in breast surgery, offering a balance between aesthetic and

functional outcomes. While it is associated with some risks, particularly concerning scar quality and long-term breast shape, these can often be mitigated through careful patient selection and the use of adjunctive techniques such as ADMs. The evidence supports the periareolar approach's versatility, particularly in oncoplastic and reconstructive surgeries, where it consistently delivers high levels of patient satisfaction and excellent aesthetic results. Future research should continue to refine this technique, focusing on optimizing outcomes for diverse patient populations and surgical indications.

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

Conclusion

The periareolar approach in breast surgery has evolved into a highly versatile and effective technique, offering significant advantages in both aesthetic and reconstructive procedures. Through careful refinement and the integration of advanced materials and techniques, this approach has consistently delivered favorable outcomes, particularly in terms of scar minimization and maintaining natural breast contour. However, the approach is not without its challenges, particularly regarding long-term scar quality and potential complications in certain patient populations. Nonetheless, the evidence supports its continued use and further refinement, particularly in oncoplastic and nipple-sparing surgeries, where it has shown to provide high levels of patient satisfaction and optimal cosmetic results. Future research should focus on enhancing the technique's outcomes through improved patient selection and the integration of adjunctive materials, ensuring that the periareolar approach remains a cornerstone in modern breast surgery.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Legend:

Figure 1: Breast augmentation with periareolarmastopexy in a post-bariatric patient where a concomitant body lift has been performed

Figure 2: Surgical correction of bilateral tuberous breast using subpectoral round implants and periareolarmastopexy.

Figure 3: Surgical correction of hypoplastic right lower pole using the "sting technique," which involves multiple percutaneous full-thickness perforations of the skin with a large needle to expand the skin before placing the implant.

Figure 4: Secondary case revising the periareolar mastopexy and changing the implant from a round 350 cc to a round 325 cc.

