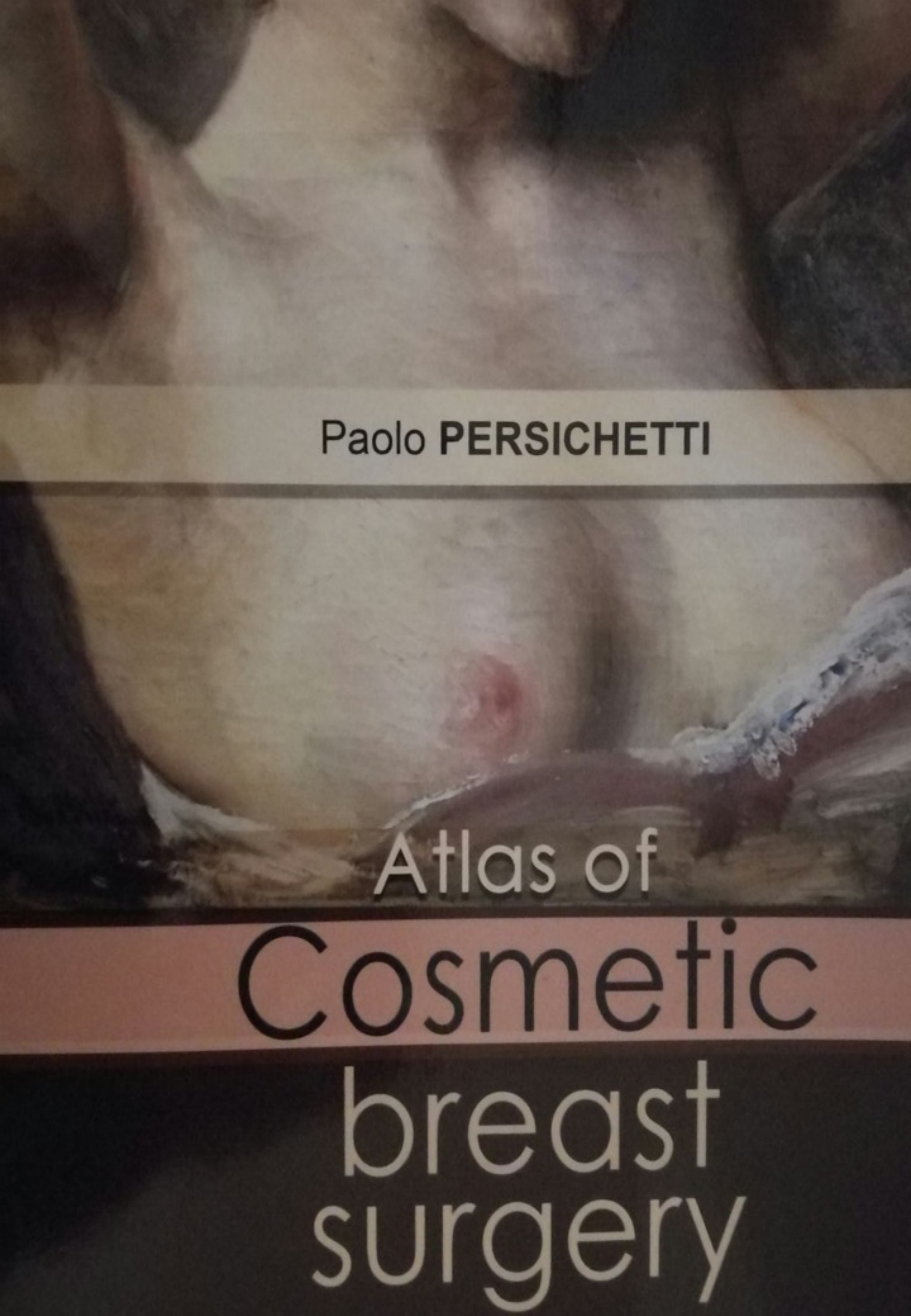

Paolo PERSICHETTI

Atlas of Cosmetic breast surgery

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EDIZIONI MINERVA MEDICA

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CONTENTS

AUTHORS

Ziyad Alharbi
Department of Plastic Surgery, Hand Surgery, Burn Center, RWTH Aachen University Hospital, Aachen, Germany

Eric Auclair
Private practice, Clinique Nescens Paris Spontini, Paris, France

Achille Aveta
Department of Plastic, Reconstructive and Aesthetic Surgery, "Campus Bio-Medico di Roma" University, Rome, Italy

Priscilla Balbinot
Member of the Brazilian Society of Plastic Surgery, Curitiba-PR, Brazil

Valeria Bandi
Department of Medical Biotechnology and Translational Medicine BIOMETRA, Reconstructive and Aesthetic Plastic Surgery School, University of Milan; Plastic Surgery Unit, Humanitas Clinical and Research Center, Rozzano (MI), Italy

Barbara Banzatti
Department of Medical Biotechnology and Translational Medicine BIOMETRA, Reconstructive and Aesthetic Plastic Surgery School, University of Milan; Plastic Surgery Unit, Humanitas Clinical and Research Center, Rozzano (MI), Italy

Mauro Barone
Plastic and Reconstructive Surgery Unit, Campus Bio-Medico University, Rome, Italy

Franco Bassetto
Clinic of Plastic and Reconstructive Surgery, University of Padua, Italy

Beniamino Brunetti
Unit of Plastic Surgery and Dermatology, Department of Medicine, Campus Bio-Medico, University of Rome, Italy

Stefano Bruschi
Department of Reconstructive and Aesthetic Plastic Surgery, Città della Salute e della Scienza Hospital, University of Turin, Italy

Alessio Caggiati
Plastic Surgery Department, Istituto Dermopatico dell'Immacolata I.D.I. IRCCS, Rome, Italy

Barbara Cagli
Department of Plastic, Reconstructive and Aesthetic Surgery, "Campus Bio-Medico di Roma" University, Rome, Italy

Gabriella Cassotta
Unit of Plastic Surgery and Dermatology, Department of Medicine, Campus Bio-Medico, University of Rome, Italy

Manuel Francisco Castello
Division of Plastic Reconstructive and Aesthetic Surgery, Clinica Villa Salaria, Rome, Italy

Barbara Catania
Department of Medical Biotechnology and Translational Medicine BIOMETRA, Reconstructive and Aesthetic Plastic Surgery School, University of Milan; Plastic Surgery Unit, Humanitas Clinical and Research Center, Rozzano (MI), Italy

Fabio Caviggioli
Reconstructive and Aesthetic Plastic Surgery School, University of Milan; Unit of Plastic Surgery, MultiMedica Holding Spa, Sesto San Giovanni (MI), Italy

Valerio Cervelli
Department of Plastic and Reconstructive Surgery, University of Tor Vergata, Rome, Italy

Maria Cecília Closs Ono
Department of Plastic Surgery, Federal University of Paraná (UFPR), Curitiba-PR, Brazil; Member of the Brazilian Society of Plastic Surgery

Annalisa Cogliandro
Plastic and Reconstructive Surgery Unit, Campus Bio-Medico University, Rome, Italy

Michele R. Colonna
Plastic Reconstructive and Aesthetic Surgery Unit, University of Messina, Policlinico "G. Martino", Messina, Italy

Adriana Cordova
Plastic and Reconstructive Surgery Unit, Department of Surgical, Oncological and Oral Sciences, University of Palermo, Italy

Guido Cornegliani
Reconstructive and Aesthetic Plastic Surgery School, University of Milan; Unit of Plastic Surgery, MultiMedica Holding Spa, Sesto San Giovanni (MI), Italy

Francesco D'Andrea
Plastic and Reconstructive Surgery Department, Second University of Naples, Italy

Fabrizio De Biasio
Breast Unit, Department of Plastic and Reconstructive Surgery, University of Udine; "S. Maria della Misericordia" Hospital, Udine, Italy

Liliana De Santo
Division of General Surgery (Breast Surgery), "Fatebenefratelli" Hospital, Isola Tiberina, Rome, Italy

Gabriele Delia
Plastic Reconstructive and Aesthetic Surgery Unit, University of Messina, Policlinico "G. Martino", Messina, Italy

Giovanni di Benedetto
Department of Plastic and Reconstructive Surgery, Marche Polytechnic University Medical School, University Hospital of Ancona, Italy

Giuseppe Di Taranto
Department of Plastic, Reconstructive and Aesthetic Surgery, "Sapienza" University of Rome, Policlinico Umberto I, Rome, Italy

Davide Forcellini
Reconstructive and Aesthetic Plastic Surgery School, University of Milan; Unit of Plastic Surgery, MultiMedica Holding Spa, Sesto San Giovanni (MI), Italy

Daniela Francescato Veiga
Plastic Surgery Division, Federal University of Sao Paulo - Escola Paulista de Medicina (UNIFESP - EPM) and University of Vale do Sapucaí (UNIVAS), Sao Paulo, Brazil

Claudia Frigo
Institute of Aesthetic and Plastic Surgery Dr. Serra-Renom, Hospital Quirón Barcelona, Universitat Internacional de Catalunya, Spain

Pietro Gentile
Department of Plastic and Reconstructive Surgery, University of Tor Vergata, Rome, Italy; Plastic and Reconstructive Surgery, Catholic University, Tirane, Albania

Micol Giaccone
Department of Medical Biotechnology and Translational Medicine BIOMETRA, Reconstructive and Aesthetic Plastic Surgery School, University of Milan; Plastic Surgery Unit, Humanitas Clinical and Research Center, Rozzano (MI), Italy

Silvia Giannasi
Department of Medical Biotechnology and Translational Medicine BIOMETRA, Reconstructive and Aesthetic Plastic Surgery School, University of Milan; Plastic Surgery Unit, Humanitas Clinical and Research Center, Rozzano (MI), Italy

Gabriele Giunta
Plastic and Reconstructive Surgery Unit, Department of Surgical, Oncological and Oral Sciences, University of Palermo, Italy

Ruth Graf
Department of Plastic Surgery, Federal University of Paraná (UFPR), Curitiba-PR Brasil; Member of the Brazilian Society of Plastic Surgery (SBCP) and International Society of Plastic Surgery (ISAPS), American Society for Aesthetic Plastic Surgery (ASAPS)

Luca Grassetti
Department of Plastic and Reconstructive Surgery, Marche Polytechnic University Medical School, University Hospital of Ancona, Italy

Elizabeth J. Hall-Findlay
Banff Plastic Surgery, Alberta, Canada

Riccardo Iannuzzi
Division of Plastic and Reconstructive Surgery, Campus Bio-Medico, University of Rome, Italy

Marco Klinger
Department of Medical Biotechnology and Translational Medicine BIOMETRA, Reconstructive and Aesthetic Plastic Surgery School, University of Milan; Plastic Surgery Unit, Humanitas Clinical and Research Center, Rozzano (MI), Italy

Francesco Klinger
Reconstructive and Aesthetic Plastic Surgery School, University of Milan; Unit of Plastic Surgery, MultiMedica Holding Spa, Sesto San Giovanni (MI), Italy

Luca Lancerotto
Clinic of Plastic and Reconstructive Surgery, University of Padua, Italy

Rosaria Laporta
Plastic Surgery Department, Sant'Andrea Hospital, School of Medicine and Psychology, "Sapienza" University of Rome, Italy

Davide Lazzeri
Division of Plastic Reconstructive and Aesthetic Surgery, Clinica Villa Salaria, Rome, Italy

Andrea Lisa
Department of Medical Biotechnology and Translational Medicine BIOMETRA, Reconstructive and Aesthetic Plastic Surgery School, University of Milan; Plastic Surgery Unit, Humanitas Clinical and Research Center, Rozzano (MI), Italy

Flavia Lupo
Plastic Reconstructive and Aesthetic Surgery Unit, University of Messina, Policlinico "G. Martino", Messina, Italy

Carlo Magliocca
Division of General Surgery (Breast Surgery), "Fatebenefratelli" Hospital, Isola Tiberina, Rome, Italy

Luca Maione
Department of Medical Biotechnology and Translational Medicine BIOMETRA, Reconstructive and Aesthetic Plastic Surgery School, University of Milan; Plastic Surgery Unit, Humanitas Clinical and Research Center, Rozzano (MI), Italy

Giovanni Francesco Marangi
Department of Plastic, Reconstructive and Aesthetic Surgery, "Campus Bio-Medico di Roma" University, Rome, Italy

Alexandre Marchac
Private practice and Consultant Plastic Surgeon at Hopital Europeen Georges Pompidou, Paris, France

Lydia Masako Ferreira
Plastic Surgery Division, Federal University of Sao Paulo - Escola Paulista de Medicina (UNIFESP - EPM); Director of Medicine III CAPES; Researcher CNPq 1A; Director of Scientific Department of Brazilian Plastic Surgery Society (SBCP), Sao Paulo, Brazil

Paolo G. Morselli
Bologna University - Alma Mater Studiorum Plastic, Reconstructive and Aesthetic Surgery School, Bologna, Italy

Dennis P. Orgill
Tissue Engineering and Wound Healing laboratory,Division of Plastic Surgery, Brigham and Women's Hospital and Harvard Medical School, Boston, MA, USA

Tiziano Pallara
Department of Plastic, Reconstructive and Aesthetic Surgery, "Campus Bio-Medico di Roma" University, Rome, Italy

Norbert Pallua
Department of Plastic Surgery, Hand Surgery, Burn Center, RWTH Aachen University Hospital, Aachen, Germany

Pier Camillo Parodi
Breast Unit, Department of Plastic and Reconstructive Surgery, University of Udine; "S. Maria della Misericordia" Hospital, Udine, Italy

Paolo Persichetti
Department of Plastic, Reconstructive and Aesthetic Surgery, "Campus Bio-Medico di Roma" University, Rome, Italy

Valentina Pinto
Bologna University - Alma Mater Studiorum Plastic, Reconstructive and Aesthetic Surgery School, Bologna, Italy

Erind Ruka
Department of Reconstructive and Aesthetic Plastic Surgery, Città della Salute e della Scienza Hospital, University of Turin, Italy

Marzia Salgarello
Department of Plastic and Reconstructive Surgery, Università Cattolica del "Sacro Cuore", University Hospital "A. Gemelli", Rome, Italy

Marco Salomone
Department of Reconstructive and Aesthetic Plastic Surgery, Città della Salute e della Scienza Hospital, University of Turin, Italy

Fabio Santanelli di Pompeo
Plastic Surgery Department, Sant'Andrea Hospital, School of Medicine and Psychology, "Sapienza" University of Rome, Italy

Carlotta Scarpa
Clinic of Plastic and Reconstructive Surgery, University of Padua, Italy

Nicolò Scuderi
Department of Plastic, Reconstructive and Aesthetic Surgery, "Sapienza" University of Rome, Policlinico Umberto I, Rome, Italy

Francesco Segreto
Department of Plastic, Reconstructive and Aesthetic Surgery, "Campus Bio-Medico di Roma" University, Rome, Italy

José Maria Serra-Mestre
Plastic and Reconstructive Surgery Department, Second University of Naples, Italy

José Maria Serra-Renom
Institute of Aesthetic and Plastic Surgery Dr. Serra-Renom, Hospital Quirón Barcelona, Universitat Internacional de Catalunya, Spain

Matteo Signoretti
Division of Plastic and Reconstructive Surgery, Campus Bio-Medico, University of Rome, Italy

Mattia Siliprandi
Department of Medical Biotechnology and Translational Medicine BIOMETRA, Reconstructive and Aesthetic Plastic Surgery School, University of Milan; Plastic Surgery Unit, Humanitas Clinical and Research Center, Rozzano (MI), Italy

Pierfranco Simone
Division of Plastic and Reconstructive Surgery, Campus Bio-Medico, University of Rome, Italy

Luca Spaziante
Department of Reconstructive and Aesthetic Plastic Surgery, Città della Salute e della Scienza Hospital, University of Turin, Italy

Francesco Stagno d'Alcontres
Plastic Reconstructive and Aesthetic Surgery Unit, University of Messina, Policlinico "G. Martino", Messina, Italy

Mauro Tarallo
Department of Plastic, Reconstructive and Aesthetic Surgery, "Sapienza" University of Rome, Policlinico Umberto I, Rome, Italy

Stefania Tenna
Unit of Plastic Surgery and Dermatology, Campus Bio Medico University of Rome, Italy

Maria Cristina Toffanin
Clinic of Plastic and Reconstructive Surgery, University of Padua, Italy

Patrick Tonnard
Coupure Centre for Plastic Surgery, Ghent, Belgium; Department of Plastic Surgery, Free University of Brussels (VUB), Belgium

Matteo Torresetti
Department of Plastic and Reconstructive Surgery, Marche Polytechnic University Medical School, University Hospital of Ancona, Italy

Massimiliano Tripoli
Plastic and Reconstructive Surgery Unit, Department of Surgical, Oncological and Oral Sciences, University of Palermo, Italy

Alessandra Veronesi
Department of Medical Biotechnology and Translational Medicine BIOMETRA, Reconstructive and Aesthetic Plastic Surgery School, University of Milan; Plastic Surgery Unit, Humanitas Clinical and Research Center, Rozzano (MI), Italy

Alexis Verpaele
Coupure Centre for Plastic Surgery, Ghent, Belgium; Department of Plastic Surgery, Free University of Brussels (VUB), Belgium

Valeriano Vinci
Department of Medical Biotechnology and Translational Medicine BIOMETRA, Reconstructive and Aesthetic Plastic Surgery School, University of Milan; Plastic Surgery Unit, Humanitas Clinical and Research Center, Rozzano (MI), Italy

Vincenzo Vindigni
Clinic of Plastic and Reconstructive Surgery, University of Padua, Italy

Giuseppe Visconti
Department of Plastic and Reconstructive Surgery, Università Cattolica del "Sacro Cuore", University Hospital "A. Gemelli", Rome, Italy

Michele L. Zocchi
University of Science VNU-HCM, Ho Chi Min City, Vietnam; Private Practice, Turin, Italy

7 TRANSAXILLARY BREAST AUGMENTATION

P.G. MORSELLI, V. PINTO

Breast augmentation is one of the most common aesthetic surgery procedures worldwide. The main indications are represented by hypoplastic breast, breast asymmetry, amastia, age-related changes and recently feminization of chest wall in male to female transgender patients.

Several different surgical techniques have been described in literature due to the extreme variability in preoperative appearance and features of the patients; body habitus, breast size, nipple position, skin elasticity are only few of the variables that can significantly influence the final result of breast augmentation procedures and the selection of the surgical approach.

Transaxillary breast augmentation was first described by Hoehler in 1973,[1] who reported using a blunt dissection the placement of the implant in a partial subpectoral pocket. Afterwards the technique was modified in 1979 by Peterson who placed the implant in the subpectoral plane.

A decreased rate of incidence of capsular contracture and a lower risk of nipple-sensation loss have been reported by Watanabe and Tebbetts with the transaxillary technique. Despite these benefits, the well known difficulty for beginners to perform an adequate mammary pocket, obtaining precise positioning of the implant in the lower pole of the breast and the direct control of the hemostasis has led several plastic surgeons to prefer traditional periareolar and inframammary fold approaches. These issues have been partially resolved by the addition of endoscopic assistance [2] that allows direct tissue visualization of the breast pocket improving the level of technical control of implants' placement and hemostasis.

The favourable cosmetic outcomes of this procedure, related to the localisation of the scar outside of the breast, have recently determined an increasing popularity of this useful and innovative technique with or without endoscopic assistance.[3] Nowadays, the transaxillary technique is the most popular approach to breast augmentation among Asiatic women for this advantageous feature.

TRANSAXILLARY BREAST AUGMENTATION

The implants placement with the transaxillary breast augmentation approach does not require incisions on the anatomical-aesthetic breast unit. It usually requires an imperceptible access site on the breast which heals with a well-hidden and, in most cases, imperceptible scar (Figure 7.1).[4]

Figure 7.1 – Appearance of the axillary scars one year after transaxillary breast augmentation.

The site of skin incision depends mainly on patient anatomy, desired aesthetic outcomes, patient's and surgeon's preferences, without any data from the literature supporting one incision location rather than another in terms of complications. Nevertheless, in some circumstances the remote lacalization of the incision could compromise the accuracy of the pocket dissection and occasionally patients could develop a bad scar in this otherwise visible location.

The main difficulties of the transaxillary breast augmentation approach are the blunt and relatively blind nature of pocket development and the risk of uncontrolled bleeding due to the lack of direct control of the bleeding points.

BREAST POCKET PLANE

As for the traditional breast augmentation techniques, four different pocket planes for placement of the implant were described for the transaxillary approach [5] (Table 7-I).

Table 7-I – Breast pocket plane.

Breast pocket plane
Sub-glandular plane
Complete submuscular plane
Sub-fascial plane
Partial submuscular plane or dual plane

ADVANTAGES

The main advantage of transaxillary mammoplasty is the absence of any scar on the breast surface. Other benefits are the avoidance of breast ductal lesion and a low probability of sensory nerves injury and the relative loss of nipple sensitivity.[6]

PATIENT SELECTION

The indications for the transaxillary approach include (Figure 7.2):

- 3 cm or less in areola diameter;
- absence/moderate breast ptosis;
- nipple areola complex on the right position or just lower;
- skin envelope amount and quality;
- breast implant volume less than 380 cc;
- male to female transgender patient (M to F);
- patient's preference after an appropriate informed consent related to the various approaches available;
- surgeon's preference.

Figure 7.2 – Ideal candidate to breast augmentation.

CONTRAINDICATIONS

Usually the transaxillary approach is not recommended in case of severe glandular ptosis.

PREOPERATIVE PLANNING: ANTHROPOMETRIC LANDMARKS

The anatomic landmarks are useful reference points during the entire surgical procedure leading to an accurate implant placement with a breast symmetry. The landmarks are routinely marked with the patient in the sitting position and then rechecked with the patient supine on the operating table after the induction of general anesthesia.

Preoperative assessment includes (Figure 7.3):

- anatomic chest midline (M);
- breast width (BW);
- breast height (BH);
- chest wall width (CWW);
- intermammary distance (IMD);
- inframammary fold position (IMF);

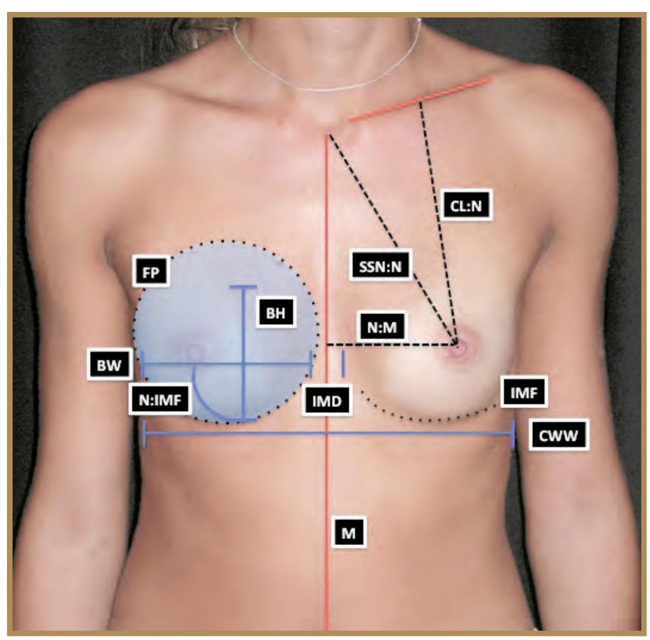

Figure 7.3 – Anthropometric landmarks in transaxillary breast augmentation.

- superstenal notch to nipple distance (SSN:N);
- nipple to IMF distance (N:IMF);
- nipple to clavicular midpoint distance (CL:N);
- nipple to chest midline distance (M:N);
- selected implant foot-print (FP);
- position of the new inframammary folds as the proposed limits of the dissection.

The soft tissue thickness and its quality are also assessed with the soft tissue pinch test and further tissue analysis. The inframammary crease is lowered from 1 cm to 3 cm when necessary, whereas the lateral dissection cannot cross the anterior axillary line.

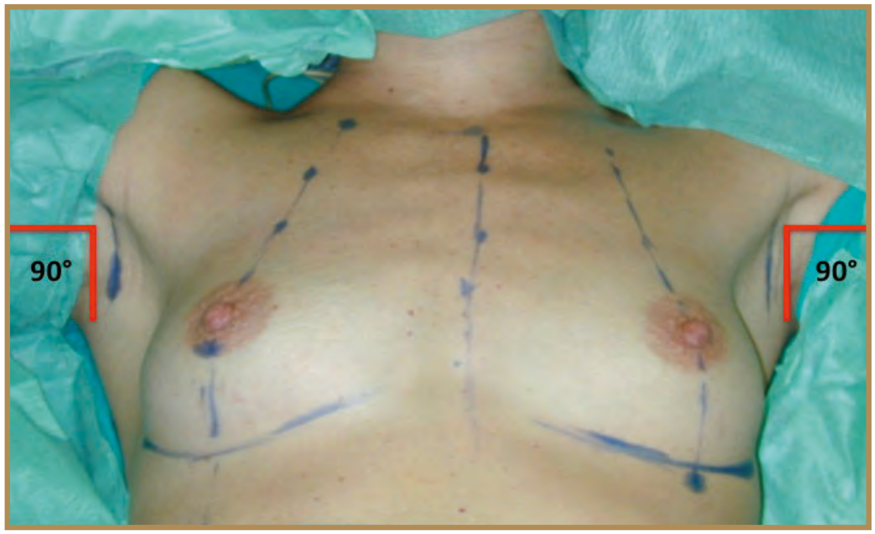

Figure 7.4 – Patient position and preoperative markings.

PATIENT POSITIONING AND SETUP

The procedure is performed under general anesthesia with complete muscle relaxation. The patient is placed in a supine position with both arms abducted to 90° (Figure 7.4). A bed tilted is needed to evaluate the patient both in supine and semi-sitting position during the surgical procedure. Moreover, enough space in front of the anesthesia machine is necessary to allow the surgeon to conduct most of the procedure standing above the patient' shoulder on each side.

Antibiotic prophylaxis with a first-generation cephalosporin (cefazolin 2 g) is provided before the induction of general anesthesia.

The axillary area has to be shaved and the patient has to be prepped and draped in a sterile way.

SURGICAL PROCEDURE

Skin incision

A 1:500,000 epinephrine solution is used to infiltrate the breast tissue and the axillary tunnel to reduce bleeding during dissection. "Italic S-shaped" skin incision is made using an existing skin crease at the level of apex of the axilla, at the junction between hair-bearing and non-hair-bearing skin and 1 cm behind the lateral border of the major pectoralis muscle using a cold scalpel down to the deep dermis.

Through a 3-4 cm incision, the skin is pulled anteriorly to facilitate blunt dissection of a subcutaneous pocket with the direct exposure of the lateral border of the pectoralis major muscle. The type and length of the incision differ depending on the type of breast implant selected.[7]

Additional markings focus on the inframammary fold are performed to define its preexisting level and shape compared to the intended level and shape created during tissue pocket dissection and breast implant placement.

The key point for an optimal procedure is an accurate preoperative markings followed by a meticolous initial tissue dissection to minimize blood staining to the tissues in the subpectoral space.

Subcutaneous dissection

A subcutaneous tunnel is then dissected up to the superolateral border of the muscle, preserving an inferolateral triangle of soft tissue containing most of the lymphatic vessels and nodes.

Following blunt dissection at the lateral border of the pectoralis major muscle, the fascia around the pectoralis major muscle is then blunty entered and further digital blunt dissection and sub-pectoral space is dissected digitally in order to create a pocket between the major and minor pectoralis muscles. The upper part of the subpectoral pocket is then dissected in a cranial-caudal direction manually.

We use a modified dissector, similar to a finger sweep tool, to enlarge the initial area of the subpectoral space. This surgical instrument has a "J" shape with the curve of the J oriented laterally and a blunt tip. As an alternative we can use the standard Agris-Dingmann dissector. The dissectors are used to confirm the adequacy of the extention of the subpectoral pocket and to check the hemostasis carefully avoiding trauma. These surgical tools are also helpful in evaluating level, shape, and uniformity of the tissue release along the inframammary fold and parasternal line and are useful to perform refinements.

After the creation of the initial subpectoral pocket, two retractors are placed beneath the pectoralis major muscle and its insertions are bluntly separated. The release of the pectoralis major muscle starts medially at a level corresponding with the external skin marking at the most medial extent of the inframammary fold. As the muscle fibres release proceeds from medial to lateral, the level of the release and curve of the intended fold may be carefully confirmed.

The dissection of the pocket is conducted from the superomedial, down to the inferomedial, the inferolateral, and up to the lateral parts in a clockwise fashion on the right breast and in a counterclockwise on the left one. At this time, usually, we use the cautery for a sharp separation of the pectoralis major muscle from its attachments. When we perform the submuscolar plane, the identification of the ribs allows to avoid inadvertent damage of chest cavity. The assistant holds the two retractors in place from the opposite side of the patient to allow the surgeon to prepare the implant for placement: the retractors are perpendicular to one another, one parallel to the clavicle in the upper part of the incision and one parallel to the lateral chest wall.

Medial side of the pocket

Medially the incomplete dissection of the costal origin of the pectoralis major muscle or the inferomedial part of the pocket could cause a higher incidence of upward or outward displacement of the implant and inconsistency or asymmetry of the inframammary crease as a result of muscles reconnection. Dissection of the medial pocket approaching the central part of the sternum has to be performed carefully: the intermammary distance should be 3 cm or more to prevent an excessive dissection of the medial side and to avoid synmastia. In addition, the surgeon must be careful regarding perforators of the internal mammary artery. For the superior boundary, the dissection is controlled not to exceed the range of the thoracoacromial artery.

Inframammary fold

The inframammary fold level and shape are checked with the patient in the sitting position. The internal level and the shape of the tissue release are repeatedly rechecked during surgery and correlated with external markings, bilaterally, to maintain proper technical control of the level and shape of the inframammary fold. If the release is at the preexisting fold level, the inframammary fold level will be lowered, so if the muscle is released 1 cm to 1.5 cm above the existing fold to maintain preexisting inframammary fold position. Careful hemostasis of the perforators of the internal mammary artery, which are near the inferomedial part of the sternum, is mandatory.

Usually, when surgical dissection is performed in the right anatomical plane, no bleeding is caused. Bleeding that cannot be controlled with traditional transaxillary approach, may require endoscopic assistance.

In secondary breast surgery, we prefer periareolar or submammary approach, even if implant exchange and capsulotomy to treat implant-related complications can be performed with transaxillary incision by skilled surgeons.

Lateral side of the pocket

Particular attention must be paid to the hemostasis of the lateral thoracic vessels and to the protection of the intercostobrachial and medial brachial cutaneous nerves. The lateral portion of the implant pocket should be developed using a blunt dissection technique, avoiding any dissection of the axillary fat pad, in order to preserve the third, fourth, and fifth intercostal cutaneous nerves, which provide sensory function to the nipple-areola complex.

Implant placement

Once the dimensions of the soft tissue pocket are satisfactory, implants are inserted.

After the selection of the breast implant, antibiotic solution is placed into the container holding the implant; the surgeons's outer gloves are replaced. The subpectoral implant pocket is then irrigated with an antibiotic solution. During implant placement, we advise to keep one hand below the device to prevent contact with the skin; the upper hand is used to guide the implant into the tissue pocket using a rolling technique along the side of the device until it is correctly inserted into the breast pocket in order to reduce or eliminate the contact between the device and the patient's skin.

Soft cohesive gel textured anatomical or round implants ranging in size from 200 mL to 380 mL are usually used; textured surface implants demonstrated a better stability attributable to tissue adherence compared to smooth surface implants; moreover these types of implants show lower incidence of capsular contracture. We choose high-profile implants because they provide a better projection of the breast's upper pole that is desired by most of the patients who underwent breast augmentation.

After implant placement, the patient is positioned in a semi-sitting position, and the breasts' shape, size, and symmetry are checked again. If necessary, at this time additional correction is performed.

When breast shape is satisfactory, wound closure in three layers is perfomed. 16 Fr (x5.3 mm) closed suction drains are routinely inserted and they are left in place about 2 days. We perform a pressure dressing in the axillary crease and on the breast surface. This postoperative pressure dressing is essential to prevent postoperative hematoma and implant displacement; after 2 days we substitute pressure dressing with an upper pole compressive bra and an elastic wrap that is maintained in place for 8 weeks.

Postoperative care

To avoid superior implant displacement, a circumferential elastic strap may be used to apply a continuous downward pressure during the early postoperative period and at least for 8 weeks.

We advise abstaining from driving at least for 15 days and from intense sport activity for 45 days.

TIPS AND TRICKS TO AVOID TECHNICAL MISTAKES AND COMPLICATIONS

Preoperative accurate planning is essential to avoid breast pocket asymmetry and implant malposition.

Skin incision marking

- Location
- Tilt

Subcutaneous dissection

- Avoid excessive dissection and detachment near skin incision.

"Upward implant displacement"

- Excessive upward dissection
- Unsuccessful inframammary fold releasing
- Extreme major pectoralis muscle detachment
- Inaccurate breast pocket tailoring (too wide breast pocket)

Breast asymmetry

- Anthropometric landmarks assessment
- Skin envelope evaluation
- Chest wall analysis (pectus excavatum/carinatum)
- For severe asymmetry consider different breast implants/ autologous fat grafting.

Possible nervous injuries

There are several motor and sensory nerves that the surgeon needs to be familiar with. Most frequently nerve injury occurs during dissection of the lateral part of the chest wall.

Thoracic medial and lateral area

Segmental thoracic nerves provide the cutaneous innervation of the breast through the anterior and lateral perforating branches.

The pectoralis major muscle is innervated by the medial and lateral pectoral (anterior thoracic) nerves. Despite their name, the lateral pectoral nerve actually innervates the medial portion of the pectoralis and courses medial to the pectoralis minor muscle to reach its destination. The medial pectoral nerve innervates the lateral portion of the muscle.

Medial portion of lateral pectoral nerve passes over the first part of the axillary vein medial to the pectoralis minor muscle, and its branches pierce the clavipectoral fascia to reach the deep surface of the muscle. The medial pectoralis nerve innervates the lower third and the costo-abdominal insertions of the pectoralis major muscle. It courses lateral to the pectoralis minor muscle which it also innervates. If one of these nerves is damaged, the denervated portions of the muscle become flaccid and atrophic and this can led to morphologic consequences on subpectoral augmented breast.

Thoracic lateral area

- The long thoracic nerve, known as nerve of Bell, innervates the serratus anterior muscle. It is superficial to the deep fascia investing the serratus anterior muscle. Arising from the fifth, sixth, and seventh cervical nerves, it passes deep to the axillary artery and vein, staying close to each segment of the thoracic wall and in its caudal part gives branches to each segment of the serratus anterior muscle. In transaxillary breast augmentation the pocket dissection would be medial to the long thoracic nerve in order to reduce probability of injury. In case of injury, the patient became inable to raise the arm above the level of the shoulder, as well as a winged scapula.
- The thoracodorsal nerve innervates the latissimus dorsi muscle. It arises from the posterior cord of the brachial plexus, runs beneath or dorsal to the axillary vein along the posterior axillary wall, and passes through the fibrofatty tissue of the axilla to the upper portion of the muscle. Injury to this nerve leads to weakens extension, internal rotation, and adduction of the humerus.
- The intercostobrachial nerve is the posterior ramus of the lateral perforating branch of the second intercostal nerve; it is a sensory nerve that runs through the axilla and innervates the skin of the axilla and upper medial aspect of the arm till the level of the elbow. Injuries of the intercostobrachial nerve can sometimes result in a significant area of numbness.
- The medial brachial cutaneous nerve is the smallest branch of the brachial plexus and arising from the medial cord; it receives its fibers from the eighth cervical and first thoracic nerves. It passes through the axilla, medially to the axillary vein, and communicates with the intercostobrachial nerve. Damages of the medial brachial nerve can result in a significant loss of sensitivity and numbness in the medial side of the upper arm.

Thoracic central area

The nipple is the most sensitive portion of the breast; it's innervated by branches of the fourth thoracic nerve that approach the nipple medially and laterally. For this reason, superior or inferior periareolar incisions of the nipple are responsible of the nipple's sensory disturb.

COMPLICATIONS (FIGURES 7.5-7.8)

Early (common to all breast augmentation techniques)

- Bleeding
- Periprosthetic hematoma
- Seroma
- Infection
- Vascular and nerve injuries
- Wound dehiscence
- Breast implant exposure
- Severe asymmetry
- Pneumothorax.

Late (common to all breast augmentation techniques)

- Periprosthetic capsular contracture
- Double bubble
- Rippling and wrinkling
- Bottoming out, stretch deformity
- Implant displacement
- Mondor's cord
- Implant rupture and deflation.

Table 7-II – Advantages and disadvantges of transaxillary breast augmentation.

Advantages
Absence of any scar on the breast surface
Direct access to subpectoral plane
Low risk of keloid scaring
Avoidance of breast ductal transection
Low probability of sensory nerve injury
Low probability of nipple sensitivity injury
Disadvantages
More difficult hemostasis control
Difficult breast pocket dissection
Impossibility of inserting implant volume >380 cc
Surgical training and learning curve

Figure 7.5 – Ideal candidate to breast augmentation. Preoperative and two-year postoperative appearance after subpectoral transaxillary breast augmentation (frontal view).

Figure 7.6 – Ideal candidate to breast augmentation. Preoperative and two-year postoperative appearance after subpectoral transaxillary breast augmentation (lateral view).

Figure 7.7 – Moderate breast ptosis. Preoperative and two-year postoperative appearance after dual plane transaxillary breast augmentation (frontal view).

Figure 7.8 – Moderate breast ptosis. Preoperative and two-year postoperative appearance after dual plane transaxillary breast augmentation (lateral view).

TRANSAXILLARY BREAST AUGMENTATION IN MALE TO FEMALE PATIENTS FOR FEMINILIZATION OF CHEST WALL

Nowadays breast augmentation represents one of the most requested cosmetic procedures and it is the most significative gender confirming surgical step in male-to-female transsexual patients, more than genital reassignment surgery.

Transgender breast augmentation is not a simple breast enlargement. It is a challenging procedure that increases subjective feelings of femininity having a high phsycological and social impact.

Different surgical approaches have been proposed to feminize a male chest wall:
- submammary incision;
- periareolar incision;
- TUBA approach;
- lipofilling;
- transaxillary incision.

Male chest has several anatomical and morphological differences from female one and the surgeon must be careful before choosing the appropriate technique for mammoplasty:
- areola diameter;
- areola position;
- nipple shape;
- nipple size;
- nipple-inframammary fold distance;
- inframammary fold position;
- soft tissue consistence and elasticity;
- major pectoralis muscle hypertrophy.

According to the reported anatomical features of the male chest, we usually perform transaxillary approach for breast augmentation in M to F transgender patients using the same steps and surgical details used in female patients.

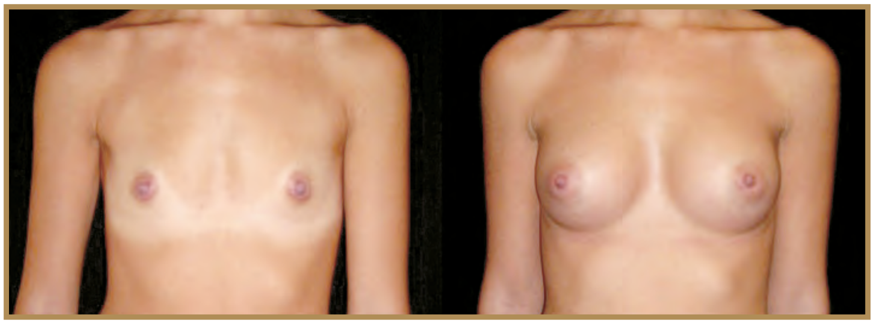

Figure 7.9 – Transgender MtoF patient. Frontal view of transgender patient before and 1 year after undergoing subpectoral transaxillary breast augmentation.

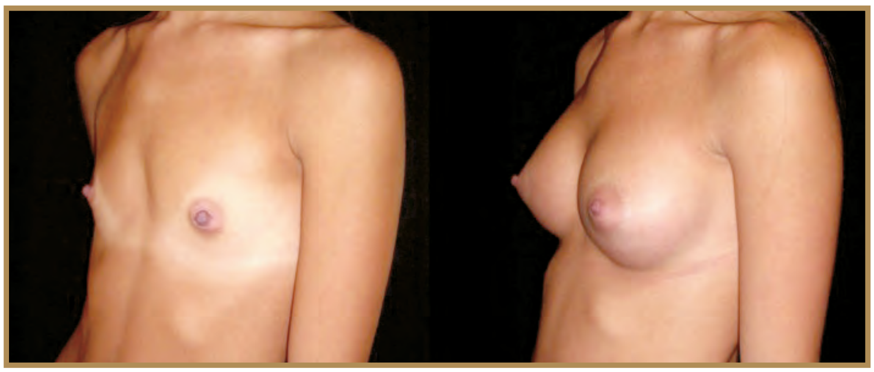

Figure 7.10 – Transgender MtoF patient. Frontal view of transgender patient before and 1 year after undergoing subpectoral transaxillary breast augmentation.

The cosmetic results reported in M to F patients are good in terms of aesthetics and feminization, and no surgical revision is generally needed.

As in female mammaplasty, even in MtoF patients transaxillary procedure is not usually followed by major postoperative complications. We reported transitory effects that disappeared spontaneously:
- undesirable impairment;
- areola hypostesia;
- nipple hyperstesia.

Nowadays transaxillary approach represents the gold standard for breast augmentation in male-to-female transsexual patients, with good results in terms of aesthetic outcomes and patient satisfaction without visible scars in the aesthetic breast area that is seen as the stigmata of the surgery and previous life (Figures 7.9, 7.10).

EFFECTS OF TRANSAXILLARY BREAST AUGMENTATION ON SENTINEL LYMPH NODE BIOPSY AND BREAST CANCER

Although transaxillary approach for breast augmentation has gained great popularity in the last years, controversies regarding possible interference with axillary lymphatic drainage and then sentinel lymph node biopsy remain under debate.

Axillary lymph node involvement is the most important prognostic factor for local and distal recurrence and for long-term survival in breast cancer and upper extremities/trunk melanoma because the presence of axillary metastatic lesions has been shown to reduce life expectancy.[8, 9]

The sentinel lymph node is the first node in the lymphatic chain to receive tumor cells via lymphatic drainage and its analysis allows to predict the status of the lymphatic chain.

The axillary sentinel lymph nodes are generally found approximately in a perimeter of 5 cm to 6 cm, about 5 cm inferior to the transaxillary skin incision, in an anatomical area defined by a "soft tissue triangle" at the upper part of the lateral border of the major pectoralis muscle (Figure 7.11).

As reported in literature, after transaxillary surgery, it is possible a partial decrease in lymphatic drainage speed as a transitory phenomenon related to local inflammatory-reaction edema rather than a proper lymphatic obstruction. In some cases we observed the formation of a fibrous band along the upper arm, resolved in 2-3 months postoperatively, either spontaneously or with massage.

Although further mapping studies are necessary to delineate more clearly the lymphatic drainage of the postoperative breast, in order to establish a treatment plan and decrease surgical morbidity, we believe that the blunt dissection technique and remaining high and anterior in the subcutaneous plane minimizes disruption of lymphatics.

When accurate dissection and careful surgical implant procedure are performed, transaxillary breast augmentation is considered a safe mammoplasty technique.

Figure 7.11 – Breast dissection pocket using the curved retractor. Axillary markings showing the subcutaneous pathway to be dissected with preservation of the "soft tissue triangle".

This is the key to preserving the lymphatic system without postoperative interference with lymphatic drainage patterns avoiding negative impact on sentinel lymph node detection.

Nowadays breast implants has been well documented in the literature do not increase the risk of developing breast cancer. Cohesive gel devices have the potential to provide a more natural breast shape, to minimize the risk of postoperative rippling and to provide a greater degree of safety if the implant lose its integrity. Silicone implants can distort glandular images because of the tension applied by the prosthesis on breast parenchima. It is generally agreed that subpectoral placement of the implant generates less distortion in the mammographic evaluation of the breast that does a subglandular implant.

DISCUSSION

Transaxillary breast augmentation is performed worldwide; it is associated with pleasant aesthetic results and the possibility of hiding and minimizing of the scar out of the breast.

Nevertheless, this approach was initially criticized due to the disadvantages of a blind technique, including a difficult hemostasis and dissection in particular for beginners. Moreover, the make up of a precise pocket and the symmetry of the inframammary creases are not always simple. Furthermore, transaxillary augmentation has been discouraged in the current years because the concern about sentinel lymph node biopsy for breast cancer and upper extremities/trunk melanoma.

Nowadays, high patient satisfaction scores associated with transaxillary incisions, compared to visible incision approaches, suggest that this procedure may be considered the gold standard in selected cases.

As for the other mammoplasty procedures, we advise careful control of the hemostasis as blood-stained tissue to avoid the risk of capsular contracture.

In selected patients, we prefer transaxillary dual plane technique in order to release the attachment between the breast tissue and the pectoralis muscle, preventing superolateral displacement of implants and controlling the bulge of the superior and medial part of the breast. Using transaxillary dual plane technique, bending or malposition, which is possible during the contraction of the pectoralis major muscle, can also be reduced.

We consider endoscopic assistance, which required specific equipment and a different dissection technique, only in selected cases.

Nowadays non-endoscopic and endoscopic transaxillary approaches have evolved enough to facilitate the patient's recovery, reducing postoperative pain, the need for drainage and the risk of displacement of implants. It's also possible obtain a well-defined and symmetric inframammary crease with similar outcomes and complications compare to inframammary and periareolar approaches.

Recent data regarding patient's satisfaction and quality of life in woman underwent transaxillary breast augmentation validate our philosophy. In fact, a recent study (level of evidence III) performed on 2430 patients comparing transaxillary breast augmentation outcomes to those of other augmentation mammoplasty techniques, demonstrated a high rate of long-term patient satisfaction in the first group. The differences between the median Breast Q assessed breast satisfaction scores between the axillary and non axillary surgical groups were statistically significant, in favor of axillary over non axillary technique. The incidence of surgical revision was 7.5% for the entire breast augmentation population and 6.8% for the patients who underwent transaxillary breast augmentation.

However, there is not only one strategy to achieve all the goals of breast augmentation in every patient. In breast augmentation it is imperative that the surgical approach, the creation of the implant pocket, the implant selection, and the implant position must always be tailored on the individual patient.

In conclusion, in selected patients transaxillary breast augmentation represents our favourite technique because scars are hidden, postoperative aesthetics outcomes improved and there is not concern about any negative consequences for screening, diagnosis and treatment in breast cancer and upper extremities/trunk melanoma.

This technique is an excellent choice for young patients with an indistinct or absent inframammary fold if they don't want a scar in the aesthetic unit of their chest.

REFERENCES

1. Hoelher H. Breast augmentation: the axillary approach. Br J Plast Surg 1973;26:273-6.
2. Tebbetts JB. Axillary endoscopic breast augmentation: process derived from a 28-years experience to optimize outcomes. Plast Recontr Sur 2006;118(Suppl. 7):53S-80.
3. Strock LL. Surgical approaches to breast augmentation - The transaxillary approach. Clin Plastic Surg 2015;42:585-93.
4. Pacella SJ, Codner MA. The transaxillary approach to breast augmentation. Clin Plast Surg 2009;36:49-61.
5. Pereira LH, Sterodimas A. Transaxillary breast augmentation: a prospective comparison of subglandular, subfascial, and submuscular implant insertion. Aesthet Plast Surg 2009;33:752-9.
6. Stutman RL, Codner M, Mahoney A *et al.* Comparison of breast augmentation incisions and common complications. Aesthet Plast Surg 2012;36:1096-104.
7. Niechajev I. Improvements in transaxillary breast augmentation. Aesth Plast Surg 2010;34:322-9.
8. Weck Roxo AC, Aboudib JH, De Castro CC *et al.* Evaluation of the effects of transaxillary breast augmentation on sentinel lymph node integrity. Aesthet Surg J 2011;31:392-400.
9. Gryskiewicz J, LeDuc R. Transaxillary nonendoscopic subpectoral augmentation mammaplasty: a 10-year experience with gel vs saline in 2000 patients-with long-term patient satisfaction measured by the BREAST-Q. Aesthet Surg J 2014;34:696-713.