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Blown up to proportion

Need skin for reconstruction? Grow it! **Marisol Chow** has the story.

Tissue expansion surgery is a procedure that enables the body to 'grow' extra skin for reconstruction in almost any part. To aid in said surgery, a silicone balloon expander is inserted under the skin near the area that requires repair. To enable tissue stretching or expansion, the balloon is gradually filled with salt water over a period of time. Although the procedure is more commonly used for reconstructive surgeries such as breast reconstruction after mastectomies, birth defects, trauma and accidents, it does aid in a few aesthetic procedures as well.

Consultant Plastic and Reconstructive Surgeons, Dr. Ananda Dorai and Dr. Mohamed Faizal Ali shed light on the mechanics of tissue expansion procedures, how they differ from skin flaps and why they may be a viable option for patients who prefer better cosmesis after surgery.

What is tissue expansion surgery?

Tissue expansion surgery is a procedure where plastic surgeons will insert an expandable balloon under the skin. The implant can be sequentially inflated via the injection of saline water over time. This will expand the tissues over the balloon. Dr. Faizal states, "This procedure offers surgeons increased amounts of soft tissue which can be used in both reconstructive and cosmetic surgeries." He also adds that implants and expanders are normally inserted in areas adjacent to regions that need resurfacing. While tissue expansion surgery is appropriate to both reconstructive and aesthetic procedures, Dr. Ananda says that tissue expansion surgery is especially applicable for reconstructive procedures or to cover a defect. "We will introduce the implant or expander under the skin adjacent to the problem site, expand the tissues in preparation for surgery, remove the expander and stretch the expanded tissues over the defect," he discloses.

Tissue expanders are normally silicone implants which have attached ports where saline water can be introduced. While all implants are inflatable, there are varying shapes, sizes and brands depending on a patient's unique needs.

Tissue expansion surgery is suited to many forms of reconstructive surgery including breast reconstruction after mastectomies, nose and forehead reconstruction, soft tissue tumours, large post-surgical scars, or any bodily defect that requires a flap.

Dr. Ananda additionally reveals that birth defects such as large facial moles can also greatly benefit from tissue expansion surgery, as skin flaps may not be viable. He says, "If patients were to have large defects on the forehead, it will be difficult to create a skin flap, as forehead skin is especially unique in texture and colour. If we were to excise the

mole, we must expand the patient's skin in order to cover up the imperfection caused by mole excisions." Dr. Ananda adds that although defects can be covered up with skin grafts, results aren't cosmetically appealing. He continues, "When we opt for tissue expansion surgery and expand non-damaged adjacent skin, tissue type, texture, colour and feel will be the same, if not similar, and this will, of course, improve cosmetic outcomes."

Tissue expansion for cosmetic surgery

Although tissue expansion surgery is more suited to reconstructive surgery, it does aid in a few aesthetic procedures including mammoplasty and treatment of alopecia. In terms of breast augmentation, Dr. Faizal expounds that tissue expansion is applicable among patients who don't want implants. "There is an apparatus called the Brava system, which is an external tissue expansion device," he says. He adds, "Instead of inserting silicone balloons under the skin, the Brava device – which is shaped like a silicone bra attached to a machine – will be placed atop the breasts and continually vacuum or expand the tissues." Although the Brava system is noninvasive, Dr. Faizal does warn that this procedure involves discipline plus motivation and requires that patients undergo daily expansions over a couple of weeks. After the tissues have been inflated to the required size, surgeons will plump up enlarged regions with autologous fat transfers.

Another instance of tissue expansion-appropriate cosmetic surgery is when patients experience hair loss. Should such patients choose not to undergo follicular transplants and prefer a fast track to thick hair, tissue expansion is an option. The procedure begins with expanding the back of the head that is not affected by hair loss. Once the skin is sufficiently expanded, the bald skin can be excised and covered with the hairy expanded tissues. Dr. Faizal explains, "We will first place the expanders under hair bearing regions and after scalp tissues are inflated to appropriate sizes, bald patches will be removed and expanded hair bearing tissues will take its place.

What are the differences between tissue expansion surgery and skin flaps?

While tissue expansion surgery is merely skin expansion and stretching it across to affected adjacent areas, skin flaps are partly detached tissues with its own blood supply used to cover defects. Dr. Ananda expands, "There are many different types of skin flaps depending on size, how it moves, rotation angle and composition of tissues; whether it's only skin or with muscle and even bone."

Dr. Faizal adds that tissue expansion surgeries involve larger skin sizes. Flaps, however, comprise smaller amounts of skin



Consultant Plastic and Reconstructive Surgeon, Dr. Ananda Dorai.



Consultant Plastic and Reconstructive Surgeon, Dr. Mohamed Faizal Ali.

and connecting soft tissues. Opting between the two surgical types will depend on patient indications and defect sizes. He asserts, "If patients have small defects that are adjacent to possible skin flap sites, then skin flaps will be the right choice. If patients have larger defects that demand higher amounts of skin or tissues, then tissue expansion will offer better outcomes." In a nutshell, although small defects can be treated with tissue expansion, patients must consider the procedure's disadvantages, including extended expansion periods, implant costs and multiple surgeries.

Why would patients opt for tissue expansions over skin flaps in breast reconstructions?

Dr. Ananda expounds that patients will leave the operating theatre with an extra scar should they opt for skin flaps. In instances where patients aren't keen on extra scars, two-stage tissue expansion surgery or a Becker implant may be better options. Dr. Ananda does warn that implants are not advisable for those still undertaking radiotherapy or chemotherapy. "When patients undergo radiation or chemo, risk of implant rupture, infection and extrusion remains high," he cautions. He goes on to suggest that should patients currently undergo such treatments, skin flaps may be the preferred choice in terms of improved durability and versatility. Dr. Ananda further reveals that although implants may be a quick fix, they have limited longevity periods of only five to ten years. He discloses, "Implants have expiry dates. This is something I always discuss with my patients. If patients are looking for short-term solutions, implants are great. If patients are looking for permanent options, then skin flaps are the right choice."

Skin expansion surgery vs. skin flaps

There are always pros and cons to every surgical type. Because one of plastic surgery's rules is always to replace like with like, surgeons will always substitute lost skin with adjacent tissues that have the same colour and texture. According to Dr. Faizal, this is where tissue expansion prevails. When tissues of similar type are expanded, cosmesis is improved. He also reports that expanded tissues as opposed to skin flaps are still sensate. "Patients who undergo tissue expansion surgery won't lose feeling in reconstructed regions and this is especially important in areas such as the breasts or scalp," he maintains. Conversely, skin flap patients are sometimes more susceptible to sensation loss unless high amounts of pressure is applied.

Another advantage tissue expansion surgeries offer is the lack of deformities on other areas of the body. Because surgeons are not creating flaps and simply stretching expanded tissues over adjacent regions, patients will return home with nothing more than a linear scar which can be hidden by the body's natural folds. The last benefit tissue expansions offer is larger quantities of reconstructive tissue. Dr. Faizal divulges, "If patients have big defects that cannot be covered by skin flaps, we can place more than one expander under the skin and this affects in increased amount of tissues for resurfacing."

Despite tissue expansion surgery's many advantages, the procedure isn't without its shortcomings. Dr. Faizal clarifies that one of its main disadvantages is the time needed to inflate the skin. He warns, "Tissue expansion is not an immediate process where one can instantaneously and quickly expand the skin after implants are inserted." He maintains that patients will have to firstly wait for wounds to heal and



subsequently return to the clinic for fortnightly inflations over the coming months. Furthermore, only a restricted amount of skin can be inflated within a single session, as there are blood supply limitations. "We cannot over-expand the skin as pressure from the implant will restrict blood supply. This could affect in necrosis or implant extrusion." To minimise complications, Dr. Faizal will instead inflate the balloon to a point where patients feel pressure, or when the skin turns white. Once this happens, balloons will be slightly deflated until colour returns to the tissues.

The second disadvantage worth noting is deformity, especially when expanders are placed in noticeable areas like the face or scalp. Dr. Faizal explains that some patients may even experience poor self-confidence during treatment and choose not to leave the house until implants are removed. Moreover, tissue expanders are costly, with patients requiring multiple surgeries including implant insertion and implant removal plus defect reconstruction. In terms of complications, risks related to foreign body materials and expanders include seroma, hematoma, infection and leakages from either the expander or its connections. "If patients experience infection, we may deflate the balloon slightly and treat the site with antibiotics and dressing and hope for the best," Dr. Faizal cautions. He adds, "If infections recur, we will have no choice but to remove the implant and repeat the process all over again."

Last but not least, surgeons must be vigilant when implanting expanders adjacent to areas such as the eyes, nose or mouth as this could impede function. Dr. Faizal divulges, "If implants are placed near the eye socket, for example, the inflated tissues or expander may obstruct a patient's sight."

Dr. Ananda personally prefers skin flaps to tissue expansion surgery, as the former requires skill and is more versatile. He expounds, "Once a plastic surgeon acquires the skills needed for skin flaps, he or she will think twice about using an expander, as flaps are a one-stage surgery that don't require constant balloon filling." He does, however, add that choosing between the two options is surgeon-dependent and there are always chances where flaps fail. "Although implants can affect in infection and extrusion, there are downsides of skin flap surgeries as well. As such, it's our responsibility to advise patients and weigh out the pros and cons," Dr. Ananda emphasises.

How long will balloon expansion take?

The amount of time needed to inflate tissue will depend on a patient's indications, how much skin he or she has, how much needs to be inflated and how large the implant may be. "If you compare the forehead versus breast reconstruction after mastectomies, forehead resurfacing may take shorter periods of expansion because lesser amounts of tissue are required," Dr. Faizal says. Dr. Ananda adds that larger defects may take longer expansion periods, as there may be more than one implant placed under the skin. On average, balloon expansions can take anywhere from eight weeks to six months depending on the many variables.