



MISSION

PLASTIC SURGERY UNDER CHALLENGING CONDITIONS

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Plastic surgery under challenging conditions means practising this specialty under difficult circumstances. The environment in which the surgery has to be performed may be unfamiliar and challenging; the working conditions may be poor; the disorders encountered may be far removed from the conditions seen in one's home country; and the range of procedures to be performed may be vast (hand surgery, burn scar revision, orthopaedics and traumatology, maxillofacial surgery, etc.)

This article is addressed to colleagues going on their first mission, and wondering what is in store for them. What disorders will they need to manage? Under what conditions will surgery have to be performed? Which techniques should one use? What instruments should one take with one on the trip? - These are but some of the many questions that arise.

We shall try to answer these questions simply, by suggesting solutions that we have found on mission trips. You should feel free to write up these ideas yourself, and to improve on the suggestions made in this article. We have tried to record, briefly, what we have learnt on a number of missions, to such countries as the Congo, Togo, Benin, Nigeria, and Armenia.

From a retrospective analysis of 100 patients operated on during such missions, we have distilled six surgical techniques that have allowed us to treat 86% of these patients. The six techniques are described in this article, together with practical management principles.

THE CONCEPT OF PLASTIC SURGERY UNDER CHALLENGING CONDITIONS

Plastic surgery under challenging conditions - what is it?

Plastic surgery is a well-defined surgical specialty, which encompasses reconstructive surgery, purely plastic surgery, as well as cosmetic (aesthetic) procedures. Thus, breast reconstruction after mastectomy for breast cancer is reconstructive surgery. The surgical treatment of breast hypertrophy comes under the heading of plastic surgery, since it modifies the shape of the breast. A reconstructed breast must, however, also have a nice shape and look good. **Plastic surgery means reconstruction to give an aesthetically pleasing result.** Looks and function are closely interrelated - something that looks good may, for this reason alone, work better; and something that works should also look good.

In Europe, different departments of plastic surgery have different approaches to cater for different conditions. Thus, a department that treats injuries of the hand will be concerned mainly with plastic surgery of the hand and with microsurgery. A burns unit will specialize in skin grafts and the treatment of burn scars, and will concern itself with such techniques as skin expansion.

Plastic surgery under challenging conditions means practising reconstructive surgery under difficult circumstances. The term commonly used nowadays is "humanitarian plastic surgery". We have opted for the phrase "under challenging conditions", since it is more general, and more realistic. "Humanitarian" may have a somewhat self-important connotation - suggesting the great white doctor come to perform great white surgery.

Also, anything a doctor does should be humanitarian, regardless of where in the world the treatment is being provided. There is no need for a surgeon to go on a mission in order to do humanitarian work. Humanitarian plastic surgery is being performed in France, day in, day out, by plastic surgeons. We can be humane without engaging in "humanitarian" work. Oddly, though, it is also possible to do engage in a humanitarian exercise without being humane: some "volunteers" appear to see humanitarian work as an opportunity to travel, rather than as an opportunity to help human beings in distress.

Plastic surgery under challenging conditions has several distinguishing features.

- It is practised in an unfamiliar and demanding environment.
- The facilities for surgery tend to be poor.
- The disorders encountered are different from the ones seen at home.
- The surgeon must be conversant with all aspects of plastic surgery (hand surgery, the treatment of burns and their sequelae, trauma, maxillofacial surgery, etc.).
- The environment will be unfamiliar, because the surgical mission goes abroad, to unfamiliar countries with health care systems that differ from the one at home (dispensaries and similar structures). Practising surgery also involves working in teams that may comprise very different personalities. Surgeons may belong to diametrically opposed "schools" of surgery, and hold very different views from their team-mates. Also, the climate will be different, as will the conditions of daily living.
- The working conditions may be poor, both in terms of the facilities provided (poorly functioning operating theatres, frequent power cuts, extremely unreliable sterility, etc.) and in terms of the administrative and patient-care infrastructure (no patient appointments, wrong diagnoses, patients unprepared for surgery, dressings not done, etc.).
- The conditions encountered will be unusual; some will be seen at an advanced stage not normally encountered back home. Thus, noma (cancrum oris) and Buruli ulcers are not seen in Europe. Patients in Europe may have burn scars, but rarely to the extent seen on missions. Congenital or tumour-related malformations tend to be seen at very advanced stages.
- The plastic surgeon must be able to turn his or her hand to very different aspects of the specialty: reconstructive hand surgery, the surgical management of burns and burn scars, the repair of congenital malformations of the face, maxillofacial reconstruction of lesions caused by certain tropical diseases, surgery to restore limb function, closure of the abdominal wall after the removal of massive tumours, etc.

Even when performed for "humanitarian" reasons, plastic surgery must address the aesthetic dimension. Many surgeons still feel that "**humanitarian aesthetic surgery**" is a contradiction in terms. How can one envisage cosmetic surgery when the object of the mission is to meet the most basic demands for surgery? Aesthetic surgery is still considered as something undertaken to prettify patients who are not really ill, as opposed to the "real" surgery provided by the "humanitarian" surgeon, who is there to help those in actual need of surgery.

Let us remember, though, that it is not for us to decide what is and what is not important to a given patient. We are here to meet the patient's demand, regardless of the nature of, and the background to, this demand. It may, undoubtedly, be more ego-boosting for a surgeon to say that, but for his operation, the patient would have been left with a functional deficit; however, the ultimate objective of surgery should be the satisfaction of the patient. And if something that looks good is more likely to function better, then why not ensure that a good functional result is also aesthetically pleasing? Regardless of the countries visited, the patients we have encountered during our missions have taught us that, to them, the cosmetic result was as important as the functional outcome, or that the two aspects were indissociable.

On one mission, we came across a young Armenian girl who had suffered terrible burns of the back of her hand. She had a huge hypertrophic scar, which did not, however, interfere with function in a major way. Through a translator, we explained to her that nothing should be done, and that, if the scar were to be removed, the skin on the back of her hand would be so tight that she would not be able to clench her fist. Our explanation was clear, and was understood by the translator and by the patient. Next day, the girl came to our clinic. She wanted to have the scar removed, and explained that she fully understood why we were against such an operation, but that she would rather have a better-looking hand than be able to move her fingers properly.

There was also a cosmetic consideration in the reconstruction of the elbow of a young man in Benin, who had had a Buruli ulcer. Buruli ulcers (caused by *Mycobacterium ulcerans*) rank third, after tuberculosis and leprosy, among the mycobacterial infections seen in otherwise healthy subjects. The majority of the patients are women and children who live in rural areas, close to waterways or wetlands. Buruli ulcers are a widespread condition in the swampy tropical and subtropical regions of Africa (around the Gulf of Guinea), in Latin America, Asia, and the western Pacific. The condition affects mainly the limbs; it gradually and painlessly destroys the skin and the subcutaneous tissue,

and may burrow deeper yet. At the post-ulcerative stage, there will be huge retracted fibrous scars, with many associated deformities.

The young man from Benin presented with one of these deformities. His right elbow was contracted, with extensive fibrosis, especially over the anterior aspect. We performed a wide resection, and managed to release the elbow completely. The defect was covered by a pedicled myocutaneous latissimus dorsi flap. Elbow mobility was excellent, and the postoperative course was uneventful. We were happy to have restored function to the patient's elbow, since, with a working elbow, the young man would be able to work in the fields, and, consequently, think of having a family. We were very aware of this association between the functional and the expected social outcome.

However, the flap was still a bit bulky, and did not look very attractive. We explained to the patient that the flap would get thinner by and by. But how does one get the concept of secondary muscle atrophy across? Also, Buruli ulcers are painless. Following surgery, the patient obviously had some pain. We had performed a successful operation, but in the patient's eyes we had done more harm than good.

In noma, the repair of some of the facial mutilations also serves an – often tacit – cosmetic purpose, even though the highly sophisticated techniques employed are designed for reconstruction. Noma, also known as cancrum oris, is an infective ulcerative and necrotic gingivostomatitis which, nowadays, affects mainly African children (in the so-called noma belt of Africa). Malnutrition, poor oral hygiene, and a variety of systemic diseases are risk factors. Mortality has been greatly diminished by the use of antibiotics and proper nutrition. At the postulcerative stage, the patients are left with major orofacial disfigurement.

I vividly remember a young girl from Togo, who came to us accompanied by some nuns from northern Nigeria. She had been living alone, outside her village, and had been raped repeatedly. Her face was terribly disfigured by noma, with a huge, foul-smelling cleft from the corner of the mouth right up to the temporal region. The nuns had been unable to do anything for her, so they had decided to bring her to us.

Basically, there was nothing wrong with her physiologically or in terms of laboratory parameters. She just could not chew. She was getting enough nutrition from (manioc-based) liquid feeds, and did not appear to have any nutritional deficiencies. So why did we operate on her? To restore function, that's why. To reconstruct her face, that's also why. We think that she was happy to be able to close her mouth a bit more, and to move her jaw, however little. Above all, we think that she was happy to have a face again that might no longer need to be hidden behind a veil. In more than one way, she was healed – and that was cause for happiness.

These examples prompted us to think about the true purpose of surgical missions under challenging conditions. Plastic surgery is only one modality, in a vast array of treatment approaches. Healing, function – those are the results that satisfy us surgeons. But what about pain relief? What about the fact that this girl, with her new-found face, was no longer being raped? Who can say what "healing" really means?

Humanitarian aesthetic surgery has taught us that cosmesis is essential for repair, and that there is no need for trying to justify cosmesis by saying that it is a byproduct of reconstruction: cosmesis is an integral part of reconstruction. Repairing a cleft lip in a little Asian girl could be seen as reconstructive surgery, or as aesthetic surgery. One might say that it is reconstructive surgery, because that is more "significant", or because it involves reconstruction of the muscles of the lip. The little girl might want a prettier, a more cosmetically appealing lip. So that would make cleft-lip repair an aesthetic procedure. However, the "why" is unimportant, since the "how" – the technique – will be the same, and since the surgeon will always try to achieve the best, and the most cosmetic, result. It follows that the reason for which the surgery is performed is the only criterion for calling a particular operation a reconstructive or an aesthetic procedure. Once the operation has been decided upon, the execution of the procedure will be the same. In the final resort, it is not definitions that matter: what counts is that the little Asian girl will be happy, and, as we hope, will be "pretty" happy.

In practical terms, and however paradoxical it may sound, we have learnt **not to do aesthetic surgery, but to do surgery with a view to achieving an aesthetic result**, even when working on a so-called humanitarian mission.

Plastic surgery under challenging conditions – why do it?

Because there is a demand, and we are able to offer something to meet this demand. We might ask

ourselves whether the situation has been demand-driven, or whether the offer has generated the demand. We think that the disease conditions seen in those countries have been there for a very long time, and did not suddenly occur when surgery became available.

Reconstructive surgery, on the other hand, is very old, since facial reconstruction is described in papyrus dating from several centuries B.C. Thus the Edwin Smith Papyrus contains descriptions of nasal reconstructions using cheek flaps. In those days, the punishment for adultery was having one's nose cut off. This is why enlightened surgeons offered reconstructions using flaps fashioned from the surrounding skin. These procedures are still in use today. This should make us more humble in our "humanitarian" work, our "humanity".

So why is there so much talk, these days, of plastic surgery under challenging conditions?

- Firstly, because plastic surgery appears ideally suited to the management of disease conditions found in third-world countries: congenital malformations of the face or the limbs, skin sequelae of burns or of tropical diseases, various tumours, functional sequelae after limb trauma, etc.
- Secondly, because plastic surgery has, by now, become a specialty in its own right. In the past, surgeons on humanitarian missions would apply the techniques they were familiar with, and the nature of the surgery performed was less well defined in terms of surgical disciplines. This does not mean that the work done was less effective – but it was general, rather than specialized, surgery. A surgeon would treat all comers, provided that he or she had the necessary technique. However, as surgery became more specialized over time, so did the humanitarian missions.
- Thirdly, because plastic surgery is a readily "exportable" specialty. The surgical instruments required are fairly simple and easy to carry. Skin surgery is less susceptible to infection. The result is readily seen, and often obeys an 'all-or-none' law: if a flap is to go necrotic, it will do so straight away, and the situation can be remedied immediately. Patient follow-up is reasonably easy and straightforward to manage. Techniques are easier to teach, since what needs to be done is more readily "visible", and hence more readily understood.
- Fourthly, because there are voluntary teams – nurses, anaesthetists, and surgeons – who will go on missions of this kind.
- And, lastly, because we operate on many children during these plastic-surgery missions. It is dreadful to think that children's lives are blighted by disease or disfigurement, but many think that there is no way out. Must these children really hope in vain? Medicine can add years to the children's lives; plastic surgery can add life to these years. **Perhaps, giving a disfigured child new hope means giving new substance to the hopes of us surgeons.**

Plastic surgery under challenging conditions – for whom?

Reconstructive surgery missions are organized by individual plastic surgeons or by humanitarian organizations. Such voluntary organizations may specialize in plastic surgery (as is the case with Interplast-France), or cover plastic surgery as part of a wider range of projects (as is the case with **UMAF** – the Union des Médecins Arméniens en France –, or **Médecins du Monde**).

Plastic surgery under challenging conditions – who does it?

The composition of the teams will vary with the mission. There may be only one surgeon on the team, if the host facility has all the other personnel required. Conversely, a complete team may go out, in order to ensure that it can operate independently. Interplast-France teams usually include two surgeons, two theatre nurses, one anaesthetist with an anaesthetic nurse, and one liaison officer. Having two surgeons allows the team to work in two theatres simultaneously, or to have one surgeon assisting the other in complex operations. Also, indications can be discussed and agreed with another surgeon, and there will be cover should one of the surgeons be taken ill or be prevented from operating for other reasons. The addition to the team of a liaison officer has been comparatively recent, but has proved very valuable. The liaison officer looks after all the supplies and maintenance aspects, and liaises with the authorities in the host country. It may be thought that having a liaison officer is a bit of a luxury on a humanitarian mission; however, experience has shown that time spent looking after the supplies and maintenance side of the work, or talking with the local representatives, is mission time well spent. It also frees the surgeon from these activities, and allows him or her to devote that much more time to the patients.

Plastic surgery under challenging conditions – with whom?

Any mission of this kind involves the local patients, requires the help of local medical and non-medical personnel, and is carried out under a local authority. Other persons may be involved, depending on the host country.

- The patients and their conditions

For a surgical mission to be launched, there must be patients who ask for surgery, and local surgeons who express the wish for such assistance. No patients, no mission – it's as simple as that.

The concept of a "patient" is a European one. In our part of the world, a "patient" is indissociable from his or her condition. In Africa, to take that continent as an example, the patient and his or her condition are two discrete concepts.

In Africa, the patient belongs to a family, a village, or a tribe. Whatever he or she is suffering from will not be seen as having come about by chance. The patient has a story, which doctors will need to listen to. Also, the real patient may not be the person one actually sees. The patient brought to the clinic may be just a representative of a family, and perhaps it is the family that is "sick".

The condition may, indeed, concern a family or a larger community. The condition will not have come about by chance, and it has a history attached to it. This history will need to be understood – and yet, we have neither the time nor the capacity to listen to it properly. There is always a "reason" for an accident that happens to someone, or for a disease that strikes a patient. The person concerned may have trespassed on a site where the "spirits" dwell, or contravened the rules by eating partridge meat. In some villages, there are sites that are out of bounds during certain hours of the day. Offending against this rule may have been the root cause of an accident or a disease. Some families are forbidden to eat partridge meat or pork. Again, breaking this rule may account for the accident or the disease suffered by the patient. There is always a reason why, and this may explain the fatalistic attitude seen in people from that part of the world.

We are just technicians, who repair the surface, whereas the evil may come from the "depths" of the forests. How can one treat, with a simple skin graft, the face of a child that is being "eaten" by his grandmother? In Africa, the condition is not always the patient's own, and the sick person is not always the patient.

For these reasons, it may be difficult to provide surgical treatment for "the condition", and even more difficult to treat a patient that one cannot see. It would be preposterous to claim that one can truly treat, with a skin flap, an ill that one does not know. However, African families tend to increasingly accept Western (so-called modern) treatments for conditions that they have "known" for a long time. This "progress" in their attitude will need to be matched by progress on our side: we must try to "see" the patient, and look after the patient's history as much as after his or her actual condition. Above all, we must become more humble, because the vast array of our techniques is powerless against the river gods. We can do nothing without the help of the family, of the village chief, or the local healer. To touch a patient's body requires consent – and, in this respect, the consent of the family, the "group", or the "healer" is as important as the indication pronounced by a Western team of surgeons. As repairers of the human body, we should stick to our last, and let the healer do whatever is felt to be necessary in the local community. We are doctors, and must act as such. That is how we are seen by the patients, and that is how we can help them most efficaciously. Treating the "metaphysical" aspects of the patient's condition is part of the expertise of the healer, who will be better able to deal with the "zima" side of the treatment. In the interest of more effective patient management, treatment will need to be multidisciplinary – and the lead figure will not always be the one we would imagine.

It should also be remembered that the patients show great courage in accepting our treatments, which, to them, may appear surprising or puzzling. Just think of what it must be like for a little child from a small village far away, who is taken, for the first time in his or her life, into an operating theatre. Imagine what must go through their heads when they see an operating light shining down on them, and all those people in their blue disguise moving about in a complicated ritual. What must it be like for them to see the chief of this sect, who wears the "mask" of an unknown tribe and speaks to them in a weird dialect? This chief is called a surgeon – but what power does he have?

The way in which traditional local treatments are provided may appear somewhat bizarre to us. What we must realize is that, to the patients, our way of going about things will appear equally weird. However, in both systems the way in which things are done is important for the effectiveness of the treatment, and, consequently, for the patient. This is why we accept that patients should be managed with the consent of the local authority, and with support from local practices. The object of the exercise is to cure the patient. Little does it matter whether this cure is brought about by a well-

performed graft, or because the evil spirits from the forest have been chased away.

Finally, let us not forget that, until quite recently, a labial cleft was known as a "hare-lip" in our part of the world. The image came from the countryside, where it was thought that a woman who had a cleft baby had met an "evil animal". The idea of a river god is no more absurd than that of a hare that puts a spell on a woman. We feel that it is important to respect the spiritual domain in our treatment schemes. After all, "the spirit can heal."

- The local doctors

Having patients is necessary, but not sufficient. It is quite impossible to think that one could treat patients in a country without the agreement and the assistance of the doctors in that country. There are several reasons why that is so.

Firstly, it would be discourteous to treat someone else's patients without asking that doctor's opinion.

Secondly, it would be difficult to go to a country without letting the local doctors know beforehand; to treat the patients without involving the local practitioners; and to leave without ensuring the postoperative follow-up of the patients. As a rule, one of the first problems encountered by a mission is patient recruitment. In order for the visiting team to have patients to treat, the difficult cases have to be identified and selected, and this cannot be done without the involvement of the doctors "on site". Also, when a mission is completed, it is vital that the local doctors can ensure the follow-up of the patients.

Thirdly, humanitarian missions are designed to provide an exchange of ideas and even training; it would, therefore, make sense that everything should be done in close cooperation with the local colleagues. One of the purposes of a mission should be the training of our foreign colleagues in the techniques practised by ourselves. Ideally, selected techniques should be taught, which could then be practised by the local surgeons. This teaching function of humanitarian missions can be provided in a variety of forms. **In our experience, teaching a limited number of more specific techniques is to be preferred; and what is taught should be taught right there and then.**

We prefer to train the surgeons at the local facility, since that way the techniques can be suited to the conditions encountered locally, and the correct application of what has been taught can be monitored immediately. Being there means that one can adapt a procedure to suit the actual conditions under which surgery has to be practised. Thus, surgical drainage is a principle that applies, and can be taught, anywhere in the world.

However, conventional suction drains cannot be used in Africa, for financial reasons. There, a more manual drainage system, involving the use of syringes, will need to be employed. This example shows that between surgical theory and the application of that theory there may be a gulf that only familiarity with local conditions can bridge.

We have also learnt to be less ambitious in the teaching of surgical techniques. In the light of our experience, we have come to prefer one or two well-defined techniques for the management of a well-defined condition, rather than to teach a whole range of techniques which will be difficult to absorb and will often be of academic rather than of practical interest. The most gifted surgeon would find it hard to learn an entire new discipline in a very short time. We would rather teach one or two techniques that can be reliably applied to the local patients. Thus, for the management of burn scars in the hand, we prefer full-thickness skin grafts plus a simple flap pattern for web-space repair. There are many highly sophisticated techniques for burn reconstruction; however, these techniques are more difficult to teach and to apply. Skin grafting may appear to be less glamorous, but is comparatively simple to teach, as well as very effective – and that goes for anywhere in the world.

- The local paramedical personnel

The teams in the host countries are usually very kind and very dedicated. They throw themselves into the work, and pay great attention to the nursing techniques that we demonstrate.

However, many of us have felt, at times, that things may appear to have been perfectly understood when we have explained or demonstrated them, and yet, when it came to the practical application of what had been learnt, the message obviously had not got across. This is an important point to bear in mind, because we have learnt from this experience that nothing must be neglected, especially when it comes to postoperative care. Rather than ask someone else to do a dressing, we would do it ourselves. **A dressing that has been done is no longer waiting to be done.**

We have also learnt that, on some missions, drugs and dressing materials tend to get stolen; and that the only way to make sure that the patient gets what has been prescribed is to literally give the medication to the patient (e.g. by sticking the antibiotics to the patient's skin with sticky tape, so that he or she can take them without the need for a care-giver) or, in the case of a child, to involve the mother. Mum is always best. Even then, things can go awry, and I remember the occasion when what Mum was doing was well-meaning but misguided. It happened in Togo, where we had operated on a little girl with burn scars. After the procedure, we asked the mother to provide simple care: just to keep washing the wounds with water, and to put on a dressing. We trusted her implicitly, and just left her with the necessary material. Our confidence was not misplaced, because she did exactly as she had been told. She did wash the wounds, not once but twice daily. Unfortunately, we were inexperienced and lacking in foresight. In Africa, the big problem is water. Without access to a tap water, the mother had washed the wounds for several days, using the same water day in, day out; and the wounds had become infected. Since then, we have recommended a minimum of postoperative dressing, so as to prevent infection as much as possible.

Wherever mission work has taken us, we have always met some outstanding people, and seen great skill and dedication, at the facilities and in the operating theatres where we have worked. There was that highly skilled male nurse ... that lovely motherly female nurse ... there has always been someone to remember. One may not immediately find these special people, but they will be there, and they will need to be identified, because it is they who will provide the crucial link between the team and the patients. Similarly, we have always come across brilliant doctors, and met outstanding surgeons who could employ unusual but highly efficacious techniques. One can learn a lot from one's blood brothers.

- Local authorities, local formalities

Missions are usually organized under the auspices of the Department of Health of the host country. Even where the mission is funded entirely from private donations, and organized at a non-hospital facility, it would be politic to run it under the auspices of the local authority. This can be useful in several ways. Visas may be more easily obtained, local permits more readily granted, and the practice of surgery itself made easier. The Department of Health of a third-world country may well ask you for your certificates, and even a complete CV, before letting you operate. That is nothing to take offence at.

To give just one example: In a country in the Indian Ocean, I was asked to provide evidence of my registration with the French General Medical Council, to show that I was allowed to practise; I even had to submit a photocopy of my School Leaving Certificate. At first, I was mildly irritated by these demands, but told myself that surely there was a good reason why the authorities were asking for all this paperwork. In fact, some European doctors who would have been insufficiently qualified back home have been known to use the mantle of humanitarian missions to work, more or less legally, under the tropical sun (Comoros); while doctors who had originally come from a third-world country may take part in a specialized mission (Red Cross, Médecins du Monde) in order to go "back home", claiming expertise in a specialty that they have not got.

Apart from the Health Minister and his staff (which may be numerous), the manager of the hosting hospital is a Very Important Person. It would be rude not to make one's obeisance to him – just as one would to the heads of the local religious communities, the district chiefs, and all sorts of people who represent all sorts of people. This is precisely why it is so important to have a liaison officer as part of the team. This team member will meet the local authorities, and save the team a lot of valuable time. Whatever one may think, these meetings are indispensable, since they follow the rules of courtesy in international contacts, and may help to forge links that will help future missions.

Similarly, it has become clear to us that there are some local "formalities" that make humanitarian missions run more smoothly in these countries. It is not a great secret that "presents" are always welcome. The present may be the "extra" paid to the local customs officer to allow our surgical equipment to be cleared more quickly. It may take the form of surgical equipment "offered" to the hospital manager, to thank this VIP for allowing us to operate. A present may simply be some money offered to a district chief to allow us to set foot on his territory – etc.

We think that respecting these local rules and institutions is a must. Without encouraging these practices, we must live with them, since we have neither the power nor the right to fight against them. We are only there to treat as many patients as possible in the best possible way, while we are in the country. In order to do this, we have to submit to the local rules. If a child needs surgery, we'll perform this surgery. And if, in order to do so, someone will need to be offered a "present", we have to comply if we can. And let's face it: any surgical equipment given to a hospital (even if it finishes up in someone's private clinic) will remain in the country, and will, thus, be a gift to the country. There is nothing we can do to change the local "rules", which have existed for a long time

and are part of the local tradition.

Another thing we have learnt, mainly in Africa, is that everything has a price, however modest; and that everything is paid for, if only with a few pieces of fruit or a chicken. This is perhaps a good thing. By paying something for what he or she has received, the patient preserves some dignity – it is his or her way of saying Thank You, and it is important for them to be able to do so. We also know that a patient who is “involved” in his or her treatment will have more benefit from this treatment – and that goes for patients wherever they are.

ORGANIZATION OF THE MISSION

Before you go

There is a minimum number of steps to be gone through prior to leaving on a mission trip.

The basic requirements are that the authorities of the host country should have agreed to receive a team from abroad, that the necessary funding should have been provided, and that the surgical team should have been set up.

German humanitarian mission teams have taught us the importance of a “time schedule check list”. This is a count-down, involving several meetings, which starts 12 months prior to departure. Without necessarily insisting on such an early start, we would recommend that preparations be started about six months ahead of the intended departure date.

Time schedule check list

- 6 months before: Make up the team, check mission funding, ensure agreements with host country have been concluded..
- 4 months before: Team meets, list of necessary equipment (for anaesthesia and surgery) and consumables is checked. Assign tasks: decide on who looks after the anaesthetics, the surgical supplies; who goes to the embassy to get the visas; etc.
- 2 months before: Check equipment and visas. If possible, arrange for a short pre-departure meeting.
- 1 month before: Check flight tickets; contact airline to start negotiating excess baggage charges. Some airlines will carry excess baggage free, as a humanitarian gesture. If this concession is not made, try to distribute the excess among the different team members. Some anaesthetic items (such as opioids) may cause customs problems. Getting all the kit into the host country may be made easier by having a local representative there on arrival. With customs clearance “eased” in this way, we suggest you keep all “dodgy” items with you. Secondary clearance comes under a different section of the customs service, usually does not take place until the following day, and will involve more difficult negotiations.
- 1 week before: Send the parcels ahead via the airline or some other carrier (sending things by boat is less expensive). On the foreign affairs Web site, check the latest political situation in the country you are going to. Make the last pre-departure appointments, and finalize your preparations.

Surgical Check list

For the outpatient clinic

- A book for case notes and ball-point pen(s). Ideally, the book should allow duplicate copies to be made. In this way, one copy can be left in the patient’s charts, as a permanent record of your work on the mission.
- A standard and/or a Polaroid camera, for taking snapshots in the clinic, to be stapled to the case notes.

A polaroid has several advantages:

- It allows patients to be recognized subsequently. People in other countries “all look alike”. In northern Nigeria, one noma case looks like any other noma case, especially when the children are of the same age and from the same tribe.
- It allows the true extent of the lesions to be assessed. This makes for more accurate planning of operating

time at the team conference the night before the operation. In the outpatient clinic, one tends to get carried away by one's enthusiasm for surgery and the thrill of having discovered an interesting case; this does not allow one to assess the case calmly. We tend to say, "That will be a latissimus flap," or "We'll do an osteotomy and a local flap here," etc. When it comes to the actual operation, one finds that one or two other things need to be done, and the whole procedure may take up to an hour longer than envisaged. Patients at the end of the day's list may have to be postponed because time has run out.

- The Polaroid photo will stay in the patient's charts. Ideally, a postoperative Polaroid should also be left in the notes.
- Some patients may also be given their picture – which may be more important to them than anything we will have done for them as surgeons
- A blue towel, for use as a background against which the photos will be taken;
- Felt markers (for drawing the patterns, and to write the patients' names), a tape measure;
- A pocket torch for the examination of the inside of the nose, the mouth, etc.;
- Identity badges for the team members, to enable patients and local personnel to know who is who;
- Spare batteries (for the cameras, examination lamps, etc.);
- Miscellaneous items, as dictated by your specialty and your way of working.

For surgery

- Case or bag for carrying supplies;
- Sterile and non-sterile gloves;
- Goggles;
- Operating theatre wear: three cotton outfits, including overshoes or clogs, masks, caps (we recommend cotton "bandanas", which are better at soaking up sweat running down the forehead), etc.;
- Sterilization indicator tape;
- Surgical or ordinary soap, nail brushes, etc.;
- Surgical gowns. Disposable gowns are expensive and heavy to carry. Using locally available coats is better.
- Consider taking a headlight, with spare batteries (power cuts are a frequent occurrence in some African hospitals);
- If possible, take a sphygmomanometer with a manually inflatable cuff, which can be used as a pneumatic tourniquet for hand surgery.
- Betadine, Dakin (for skin disinfection prior to intraoperative injections); if resources permit, include an HIV serology kit, post-exposure prophylaxis kit, etc.

Consumables

- Betadine or chlorhexidine, razors, felt markers or white pencil (for marking on very dark skin), lignocaine with adrenaline, syringes and needles for infiltration anaesthesia, scalpel blades, antibiotics, sterile drapes (which are, however, expensive and, above all, bulky to carry; consider using locally available drapes, which are, however, often worn and of poor quality), absorbable sutures (do not forget Vicryl, which has the advantage of rapid resorption in paediatric patients), nonabsorbable sutures, suckers, suction drains and bottles (these items are bulky – the vacuum bottle may be replaced by a syringe blocked in suction with a towel clip), sterile and non-sterile swabs, tulle gras, adhesive dressings, adhesive tape, eye ointment with and without antibiotics, antiseptics for use inside the mouth (for maxillofacial surgery), analgesics for postoperative pain relief, etc.

Surgical supplies

- Basic plastic surgery set. At least three sets will be required, for the performance of successive procedures. (Make sure you take your own sterilization indicator tapes.)
- Special sets: hand surgery set, with driver, pins, cement, etc., if a lot of upper limb surgery is to be done on the mission. (Don't forget to include a lead hand, or similar device in a lighter material.) If there will be much facial surgery (e.g. noma cases), take a maxillofacial surgery set with special retractors, an appropriate saw (although the Gigli is still an excellent tool), etc.

Personal Check list

- Valid passport and visa;
- Vaccination certificates (as required for your destination);

• **Photocopies of documents**

- Letter of invitation by the local authorities (in countries with a military or paramilitary system, a letter of this kind can ease travel and get you through roadside check-points.);
- Personal insurance (accident, return home, etc.) Consider paying your air ticket with your bank card.
- Check that your professional insurance covers your (professional) humanitarian work in the foreign country. Ask for confirmation in writing.
- International driving licence. For car hire, preferably go to an international company (even if it costs more), rather than to a small local outfit. In some countries, it is best to get a local driver.
- Personal medicine chest: analgesics, antiseptics, antibiotics, spasmolytics, intestinal antiseptics. Don't forget a sunscreen and sun glasses, and a mosquito repellent. Oral rehydration powders, which are rich in mineral salts, are very useful and should be taken routinely while staying in tropical countries.
- Personal toilet items. If you are not going to stay at an hotel, take two medium-sized towels (rather than one large one), plus two nails and a length of line, to hang the towels from; a mosquito net (plus some nails to fix it with); a mosquito spray; a small bottle of household bleach, for a spot of cleaning around the place; etc.
- Usual clothing (light cotton fabrics) for wear in tropical countries. Two points are worth remembering: When going to Eastern European countries, take a jacket to wear at official meetings; and in politically sensitive countries, do not strut around in rough-tough "Gulf War" gear. In Africa, at so-called official meetings, foreigners are not required to wear a jacket; however, smart-casual wear will be a sign of respect towards your hosts.
- International adapter with or without international Internet connection kit, if you envisage using your laptop. (Bear in mind, though, that hardware can suffer under conditions of heat and high humidity.)
- Small camera;
- Pocket torch;
- Wrist watch with alarm function;
- Small DIY kit (screw-driver, pliers, etc.), or a good Swiss army officer's knife;
- Books, music, other personal belongings, etc.;
- Local currency;
- Small gifts for children (balloons, ball-point pens, crayons, etc.)

While you are out there

This is a section in its own right; however, it has been left blank, since looking forward to going, and imagining what it will be like, is better than being told what it was like for someone else. To describe exactly what happens on a mission would take away some of this anticipatory thrill.

Also, every mission is unique. One cannot recount a mission. A mission is something that one prepares for; something that one lives through (often only too briefly) – it is not something that can be reconstituted afterwards in all its details. Use your imagination to take you across from where you are now, to that health centre far away.

Start dreaming about your next mission right now.

When you are back

After one's return, one cannot recount the entire trip, but there will be some stories and some anecdotes to tell. The main evidence will consist of photographs. Photographs will be all you have to show for your trip; their surgical scars will be all that will remind the patients that you were once with them.

Debriefing is essential, to enable the next mission to plan its work. We tend, increasingly, to go back to the same country, so as to ensure the follow-up of our patients and to provide continuity in the training of the local medical and paramedical personnel. We are also beginning to provide the local team with digital cameras, so that we can see the postoperative results, and can advise them, via the Internet, on specific cases waiting to be seen on the next mission.

The analysis of the series will often be complicated by the number of cases operated on, the diversity of conditions seen, the different disease stages, the variety of techniques used, the short follow-up, etc. However, publishing on this work will ensure that we have to take an in-depth and self-critical look at what we have been doing, and to ask ourselves whether we really have been as efficient as we would like to think.

Practical considerations

Before going on a mission to a developing country, one would, first and foremost, try to find out what conditions are likely to be encountered. However, a complete list of all the usual and diverse conditions seen in tropical medicine would not answer the questions of how one would cope out there, and how one would manage one's patients.

This article attempts to provide practical answers, by describing six surgical techniques which have allowed us to manage 86% of the patients encountered during missions. The other conditions seen were treated with other established reconstructive surgical techniques. This article does not aim to describe all the surgical techniques available; rather, it lists and describes the most useful and the most reliable ones.

From a retrospective analysis of 100 patients operated on during humanitarian plastic surgery missions, we have found the following **six surgical techniques** to be particularly helpful:

1. Z-plasties (and similar operations), to provide lengthening: 32%;
2. The Delaire technique for the repair of labiomaxillary clefts, and for cleft-lip scar revision: 26%;
3. skin grafts: 14%;
4. pedicled pectoralis major flap: 9%;
5. pedicled latissimus dorsi flap: 4%; and
6. pedicled groin flap: 1%.

These techniques have been used under sometimes difficult local conditions, and in demanding cases. Their essential features – which must be shared by any surgical technique to be used under difficult conditions – may be summed up in the acronym **FRED**:

F for **familiar**: the surgical procedure must be familiar to the surgeon. Doing something familiar under difficult circumstances will be more likely to produce a good result.

R for **reliable** : a surgical technique must be reliable. A failed operation is nasty, for all involved.

E for **easy**: a surgical technique must be easy to teach. Mission work means transmission work.

D for **doable**: a surgical procedure must be feasible under challenging conditions and capable of being performed single-handedly by one surgeon.

The surgical techniques described in this article would seem to meet these requirements.

What to do in practice

One of the goals of reconstructive surgery is the reconstitution of the integrity of the skin, by closing skin defects. If there are no defects, the surgeon will often create one. Reconstructive surgery is a bit like robbing Peter to pay Paul: one creates a defect in order to close another one; and then the artificially created defect will need to be closed by the creation of yet another defect, and so on.

There are various ways of dealing with a **skin defect**. This article describes what can be done, from the "simple" to the "most complex" ways of managing defects.

From the simple to the most complex

1. Do nothing (where conditions are unsuitable, one has to say no. The failure of an operation that should not have been undertaken during a mission is unpleasant and, above all, hardly justifiable.)
2. controlled healing by first intention;
3. skin grafting;
4. flaps.

Flaps

1. local flaps (lengthening);
2. regional flaps (pedicled flap from the same region – e.g. cross-finger flap);
3. distant flaps, which may be pedicled (e.g. groin flap) or free (e.g. microsurgically anastomosed latissimus dorsi flap).

To finish with these brief tips (which are, perhaps, best quickly forgotten), let us just make the point that controlled secondary healing may be difficult, and a free flap may, in some cases, be easier to perform. An inherently more complicated technique may be the easier option. The advantage of a free flap (inherently a very complex solution) is that several kinds of tissue can be reconstructed in one go, and that, unlike some pedicled flaps, it does not involve several sessions. Above all, any failure will be immediately obvious, and the patient may be appropriately revised. A pedicled flap may look great straight after surgery, but may undergo secondary necrosis. Impaired blood supply may be less obvious in dark skin, and the surgeon may have gone happily home by the time the flap has gone, unhappily, bad.

The Techniques

Skin lengthening

Indications

If the range of plastic surgery techniques had to be reduced to a single one, the choice would be the Z-plasty. Quite generally, anything that will permit length to be gained in a flat surface scar or a webbed scar has a place in humanitarian plastic surgery. We often have to deal with patients with burn scars, who will have contracted skin. These contractures may be anywhere on the body. They may be dramatic around the joints, and will benefit enormously from being released. Contractures may be post-traumatic (especially in the limbs), caused by infections, or secondary to such tropical conditions as noma (especially affecting the face).

Principles

Surgical procedures in this category are designed to increase the length of the skin. They allow a gain in length in the case of a flat surface scar or of a webbed scar.

The principle consists in making incisions in a scar or scar band, and bringing in healthy skin from the sides in order to lengthen the contractural line and, thus, to release the tension caused by the contracture.

Lengthening flaps come in different patterns. For a Z-plasty, two interdigitating triangular flaps are arranged in a Z-pattern; for a V-Y flap, a V-shaped incision is converted into a Y pattern; etc.

Some of the patterns shown in the textbooks are quite complex, although, mathematically, they are extremely sound. However, their execution may be well-nigh impossible, and the actual results may fall far short of the underlying calculations. The skin is, however, a forgiving tissue, and allows the surgeon a considerable amount of leeway. What is important is the careful marking of the adjoining healthy skin that can be brought in to provide the gain in length. Tracing the geometrical pattern is often useful; however, what matters even more is a careful palpation of the zone surrounding the scar to establish where tissue can best be mobilized. The operative word in plastic surgery is "plastic."

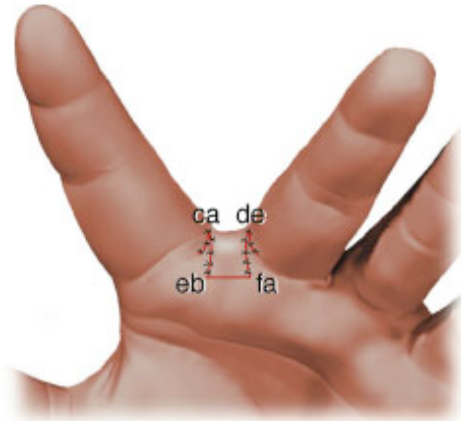
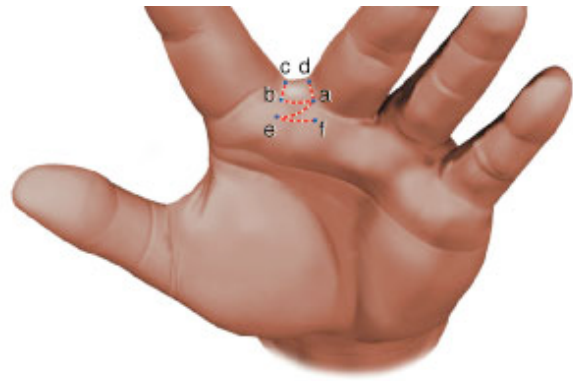
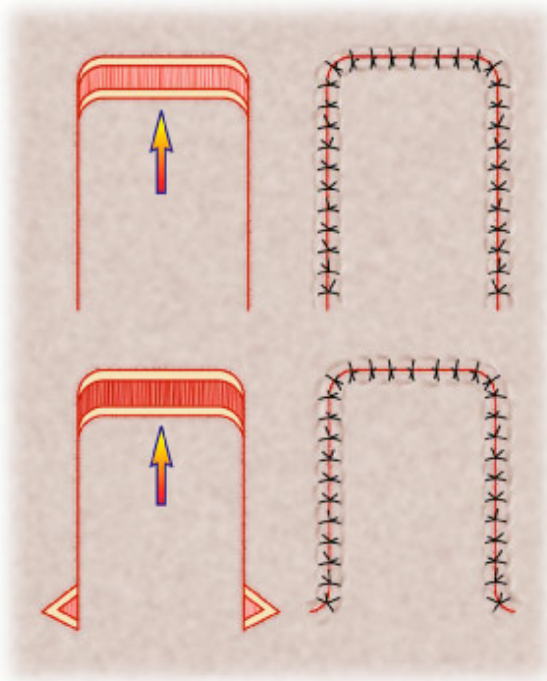
In the descriptions below, the conventional rules have been boiled down to two types of skin-lengthening surgery:

- **advancement flaps**, in which the skin is undermined and advanced (as in a V-Y flap); and
- **pivotal flaps**, in which the flap is raised and turned into the defect. Pivotal flaps come as rotation flaps, transposition flaps, IC-flaps, etc. However, regardless of the actual pattern, the principle remains the same: the flap is pivoted into the defect. A Z-plasty, for instance, involves the simultaneous transposition of the two flaps that have been raised.

Whatever the design used, these flaps will invariably be what is known as random-pattern flaps, since they are not supplied by a named artery. This is why the length of the flap has to be chosen with care: it must not be greater than twice the width of the flap at its base. This 2:1 rule is not, however, an absolute one. In a well-vascularized territory such as the face, a ratio of 3:1 may be acceptable, while in an extensive scar bed a flap of equal length and base width may have to be used.

Simple advancement flap for the management of a web space contracture





Simple advancement flap (top). Where more tissue has to be advanced, skin traction will produce "dog-ears" on either side of the flap base. These can be excised, and the suture line adjusted accordingly (bottom). The repair pattern comprises an advancement flap and two small rotation flaps.

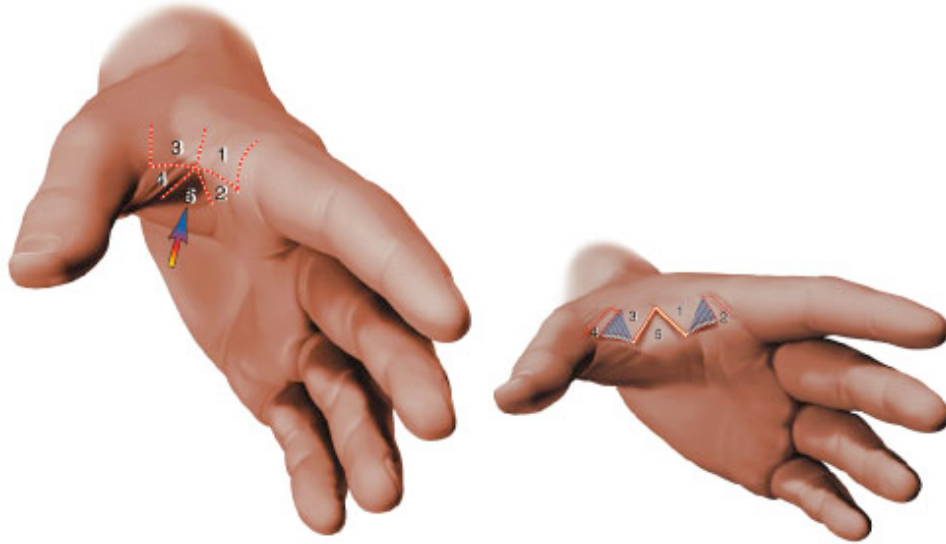
V-Y advancement flap



Basic pattern

The skin incision forms a V. Skin traction transforms the V- into a Y-shape, allowing a length gain.

V-Y advancement flap



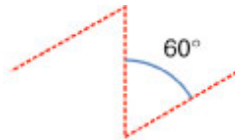
Y-V repair of a thumb-index web space contracture (flap 5), combined with small transposition flaps (flaps 1 through 4)

The first incision is Y-shaped. Advancement of Flap 5 converts the Y into a V, allowing lengthening of the scar. To further improve lengthening, transposition flaps (Flaps 1 and 2; Flaps 3 and 4) are added on either side, in a Z-plasty pattern.

Treatment of several scar bands of the web spaces and the wrist (post accidental burn) using Y-V advancement and Z-plasties.

Transposition graft (Z-plasty)

Basic pattern of Z-plasty



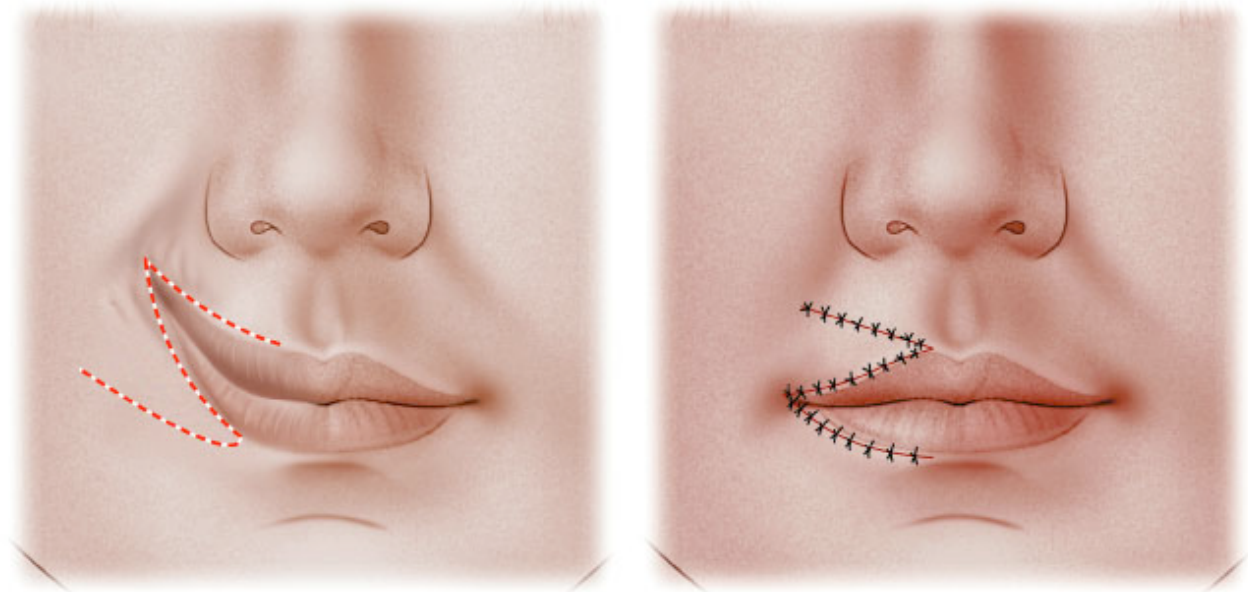
The basic pattern is a Z with limbs of equal length, with the peripheral limbs forming an angle of ca. 60° with the central limb. The size of the angle is not an absolute figure, and may be varied, as a function of the skin site, between 30° and 90° . Theoretically, the greater the angle the more the scar will be lengthened. The central limb of the Z is placed over the surface scar to be lengthened or the webbed scar to be corrected. After this line has been drawn, the peripheral limbs are added, to form two equilateral triangles (top). If the conditions have been chosen correctly, incision of the skin over the central limb will pull and transpose the triangles into their new position (centre).



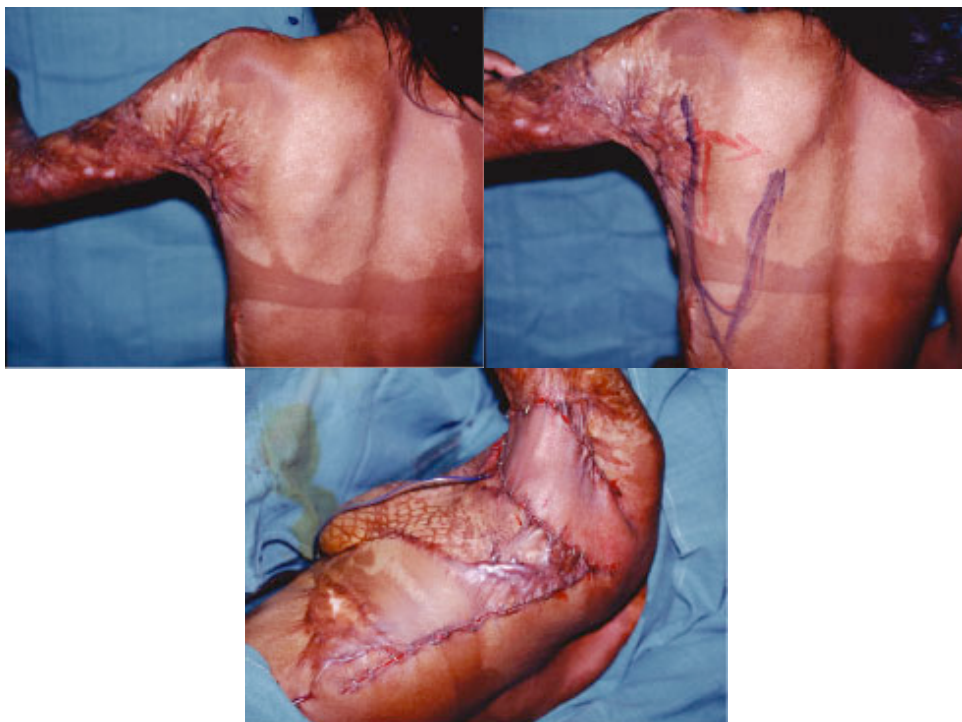
The final pattern shows how the flaps have been transposed, to form a "mirror-image" Z. The skin has been "relaxed" along the line of the old scar (bottom).



Repair of plantar ulcer with a simple plantar rotation flap.



Treatment of an oral commissure contracture using a Z-plasty.



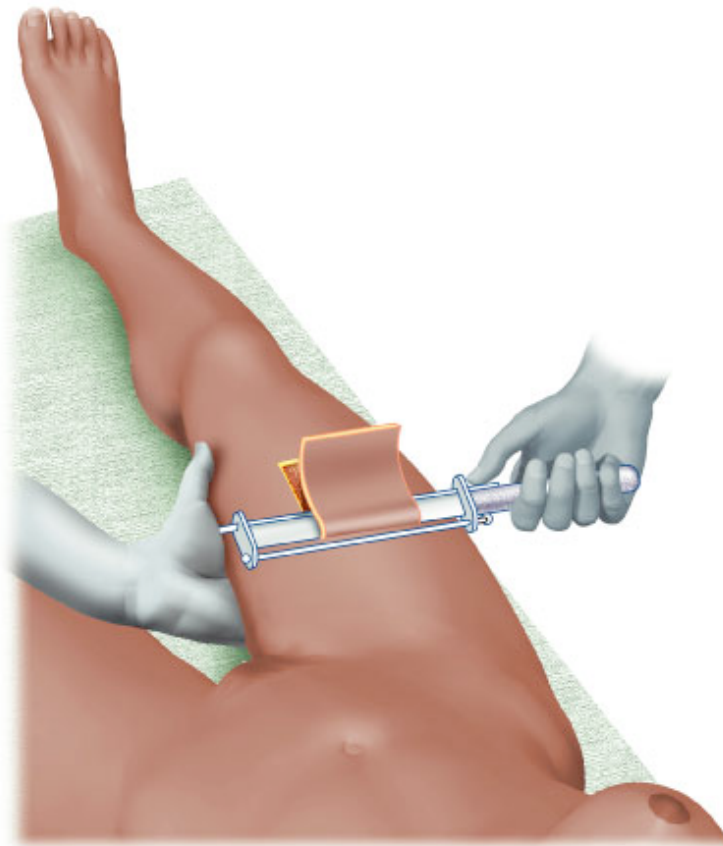
Burn scars with a bowstring scar band on the fold of the left axilla, interfering with abduction. The band is divided, and the axillary defect is covered with a cutaneous rotation flap. The skin flap is raised in the parascapular region, and rotated into the ipsilateral axillary area.

Skin grafts

Indications

Patients seen during humanitarian missions usually present with old scars. If the defect that has to be created in the revision is large, or if there are other reasons that rule out the use of local flaps, skin grafts will be indicated. Both full-thickness skin grafts and split-thickness skin grafts are of enormous benefit. Skin grafting is often thought to be a simple procedure. It is, in fact, complex surgery, and must be treated as such. All too often, surgeons will do a flap reconstruction because they believe that a mere skin graft would be too mundane. When repairing a defect, one should always start by considering the simplest solution, and opt for a more complex one only if absolutely necessary. Skin grafts are "simple" in principle, but highly complex in their details. Where an extensive defect needs to be covered, and/or where the granulation tissue is of poor quality, a split-thickness skin graft is indicated. Greater coverage may be obtained by meshing a split-thickness skin graft. A split-thickness skin graft will take better, but will contract over time. Conversely, if the defect has a good base (well-vascularized zone, or good granulation tissue) and/or where it is vital that the graft should not contract secondarily (grafts placed around joints or body openings), a full-thickness skin graft should be chosen.

Split-thickness skin graft



- Patient positioning. The patient is positioned supine. The graft is harvested from the medial and/or the anterior aspect of the thigh. The donor area is lubricated by wiping with tulle gras. The surgeon places one hand underneath the patient's thigh, and "pinches" the skin on the posterior aspect, so as to tighten the skin on the front of the thigh. With his or her other hand, the surgeon cuts the graft using a manual dermatome.

- The chief problem in split-thickness skin graft cutting is judging the thickness of the graft. With practice, setting the knife will enable the surgeon to choose the graft thickness. At the start of the learning curve, however, it may be difficult to control the thickness of the graft. If, during harvesting, fat or, worse,

muscle is exposed, the cut will be too deep. If the graft looks like tissue paper and tends to tear, the cut will be too shallow. Ideally, there should be a high density of tiny bleeding points on a white ground. This bleeding pattern indicates that the cut is in the correct plane (the dermis). When the graft has been cut, the donor area will bleed, and should be managed immediately by the application of a slightly compressive tulle gras dressing.

Exemple



Buruli ulcer of the anterior aspect of the foot, in a young man from Benin. Excision of the ulcer had left a large defect, which was resurfaced with a split-thickness skin graft harvested, with a manual dermatome, from the ipsilateral thigh.

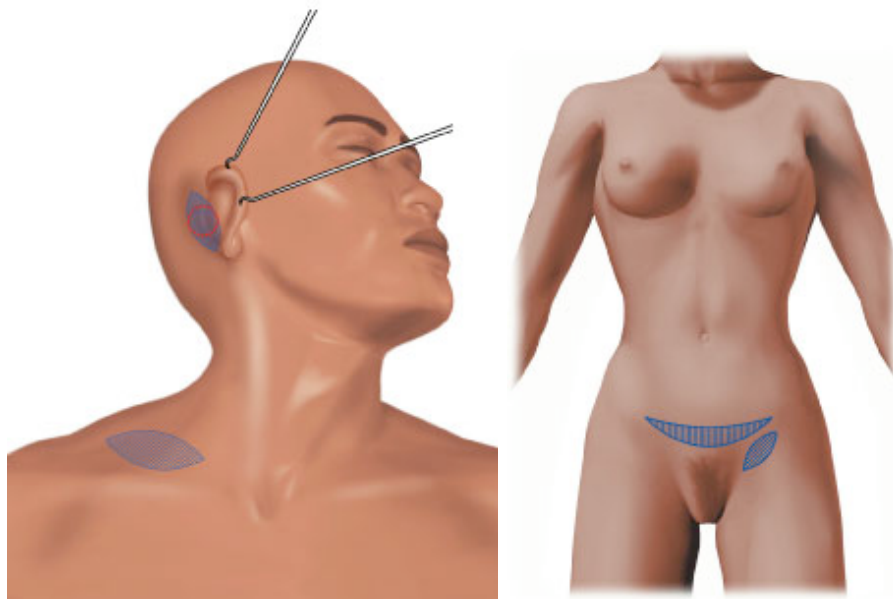
Skin grafts

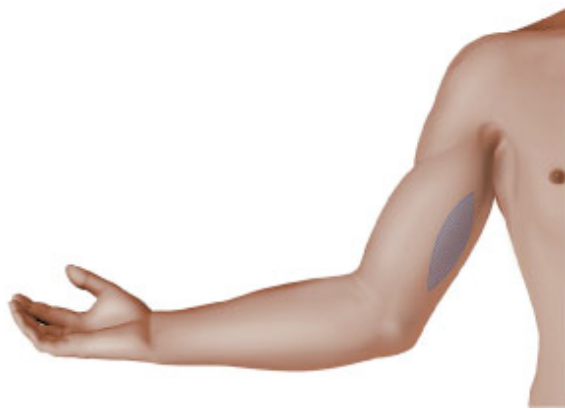


Extensive burns of the lower limb. Debridement and coverage by a split-thickness skin graft. The size of the defect called for a mesh graft, produced by harvesting split-thickness skin grafts and meshing them, using a skin graft expander to allow a larger surface to be covered.

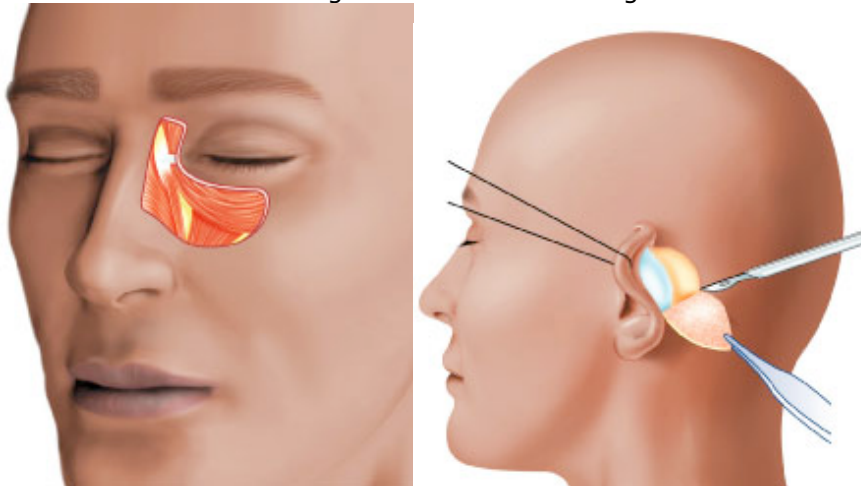
Full-thickness skin graft

Donor sites



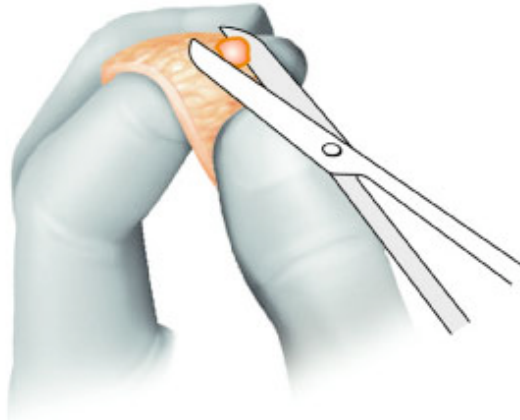


Harvesting a full-thickness skin graft



A full-thickness skin graft comprises all the layers of the skin. Its size will need to match that of the defect to be repaired. Its texture should match that of the recipient area. Harvesting must be done in such a way as to allow simple closure of the donor site.

Full-thickness skin graft preparation



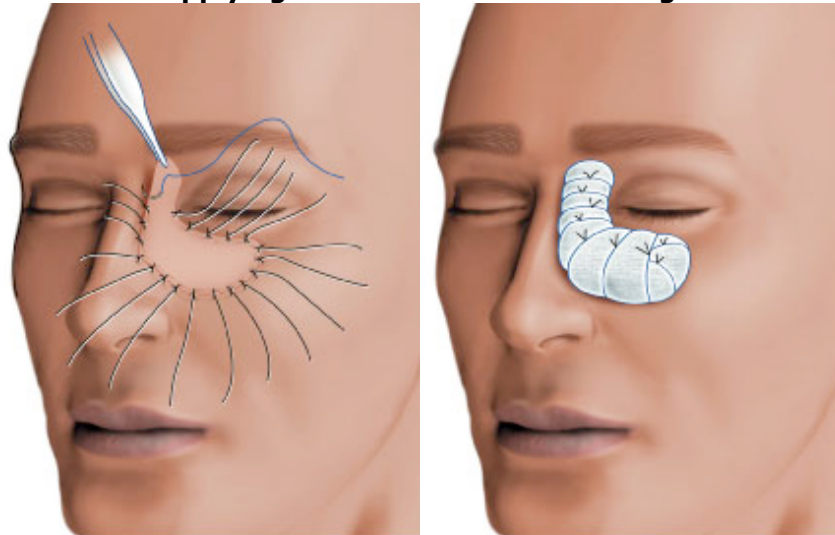
Defatting the graft is vital, and has to be done with meticulous care. This is the most important step in the technique. Any tiny lobule left behind will prevent blood vessels to sprout into the graft at that site. Trimming has to be carried out tangentially to the skin, until shiny dermis is seen everywhere. Overzealous trimming may result in buttonholing; however, this is nothing to worry about. A few little nicks are better than having fat remaining on the underside of the graft.

The poorer the recipient bed, the more thoroughly the graft will need to be defatted. However, the more fat has been removed, the thinner, and hence more liable to shrink, the graft will be.

Conversely, where the graft bed is sound, a full-thickness skin graft will take more readily. Under these circumstances, it will not be necessary to thin the graft out too much, and the slightly thicker graft will not shrink secondarily.

In practice, a commissural defect in a child is ideally suited for grafting with full-thickness skin: the site offers a good base, the graft is flexible and will not shrink, and the child will not, therefore, be at risk from secondary contracture around the body opening.

Applying a tie-over bolster dressing



A freshly placed full-thickness skin graft will be kept alive, initially, by the fluid provided through the moist dressings applied by the surgeon. Since the graft will be colonized from its base, care must be taken to ensure that it does not move and that it stays firmly applied to the graft bed. This can be done by using a tie-over bolster dressing. The graft is sutured into place, with the sutures left long.

Next, it is covered with a layer of tulle gras, on top of which is placed a flat piece of well-soaked gauze. The bolster is carefully moulded into position over the graft. The sutures are tied, and the dressing is left in situ for three days. When it comes to the removal of the dressing, great care must be taken not to lift the graft off with the bolster.

Tie-over dressings are vital in concavities. The pressure dressing snugs the graft into its concave bed. Where the graft bed is convex, a skin graft will be more liable to stay in place, and a tie-over dressing is not an absolute necessity.

Patient Example



This Congolese patient had burn scars of the right hand that had completely obliterated the web spaces. The webs were reconstructed, with close attention to the neurovascular and tendinous structures, and the defects were covered with full-thickness skin grafts.

The Delaire technique for the repair of cleft lip

Indications

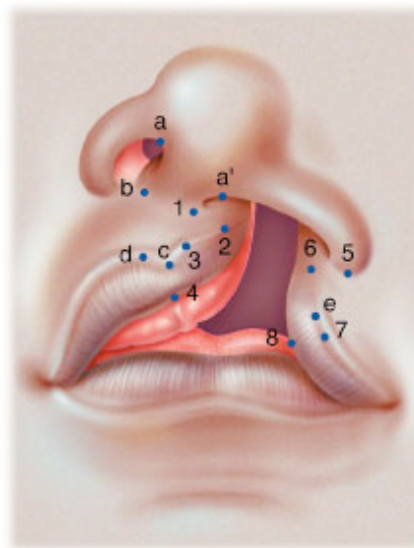
Congenital cleft lip and/or palate is a condition frequently encountered on humanitarian missions. Also, patients often present with previously operated-on clefts which have caused functional and/or cosmetic problems. Contrary to what one might expect, the patients' parents are chiefly concerned about the children's appearance. In some countries, the congenital malformation is attributed to the influence of evil spirits. In such cases, cosmetic repair may be important, the involvement of the local "healer" may also be very helpful. In the popular language, such malformations are still known as "hare-lip", even in our parts of the world – which goes to show that beliefs may be much more resistant than some hospital bugs. While, as pointed out above, surgeons would be well advised to bear these beliefs in mind, their goal will also be to restore good function, by achieving a normal force pattern of the nasolabial muscles. Reapproximating the muscles in the midline will ensure balanced growth of the face. In cleft lip, there is not a defect in the strict sense of the word. What has happened is that midline muscle fusion has failed to occur at the embryonic stage. The whole thing is like a sail with a slack sheet, which blows away with the wind. Surgery is aimed at reapproximating the muscles in the midline, just as a yachtsman would haul the sheet taut in order to make headway.

Principles

This repair involves a number of steps.

- **Tracing the incisions of the mucocutaneous elements.** The pattern follows the rules established by J. Delaire, in his excellent and very practical technique. The technique itself is an adaptation of the one devised by R. Millard (large rotation-advancement flap). **Identifying the muscles** on either side of the cleft and at the base of the septum, to which the muscles will be attached. **Release of the nasolabial muscles** from their deep insertions on the maxilla, to facilitate medial displacement and tension-free suturing to the nasal septum, to the periosteum of the nasal spine, and to the muscular counterparts on the noncleft side.
- **Reapproximation of the tissue planes** of the mucous membranes, the muscles, and the skin, using fine sutures.

Landmarks



This schematic may look like a bewildering jumble of dots and figures. Don't worry. All surgical techniques have got their difficult bits. With this technique, the crucial learning step is to spend 15 minutes looking at the landmarks. You will then know how to apply them first time round; and after that, they will become second nature.

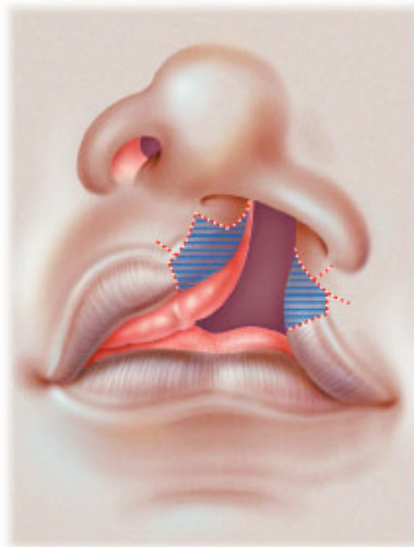
For true mastery of the craft of cleft-lip repair, one needs to control, and then to forget, the technical aspects. Just do it – and experience the fulfilment that comes from giving a little kid a pretty lip.

Take heart – it's not as difficult as you might think!

a: Superior nostril angle on the noncleft side.

- a'*: Superior nostril angle on the cleft side.
b: Base of columella on the noncleft side.
c: Lowest point in arch of Cupid's bow, at the vermilion-cutaneous junction.
d: Peak of Cupid's bow, at the vermilion-cutaneous junction, on the noncleft side.
e: Extremity of the vermilion-cutaneous roll on the cleft side.
- 1: Point situated on a line extending from the edge of the columella on the cleft side, at a distance from *a'* equal to $b-a$.
 - 2: Point situated on a line extending the line $b-1$, at the vermilion-cutaneous junction.
 - 3: Point at the vermilion-cutaneous junction on the cleft side, at a distance from *c* equal to $d-c$.
 - 4: Point situated on the moist-dry line, at a distance from the frenulum (midline) of the upper lip equal to $c-3$.
 - 5: Point situated at the junction of the nasal ala and the lip, on the cleft side.
 - 6: Point situated on the vermilion-cutaneous junction, on the line 5-6, which is at right angles to the vermilion-cutaneous junction.
 - 7: Point situated where the vermilion-cutaneous roll begins to taper (ca. 2-3 mm lateral to *e*).
 - 8: Point situated on the moist-dry line opposite Point 7.

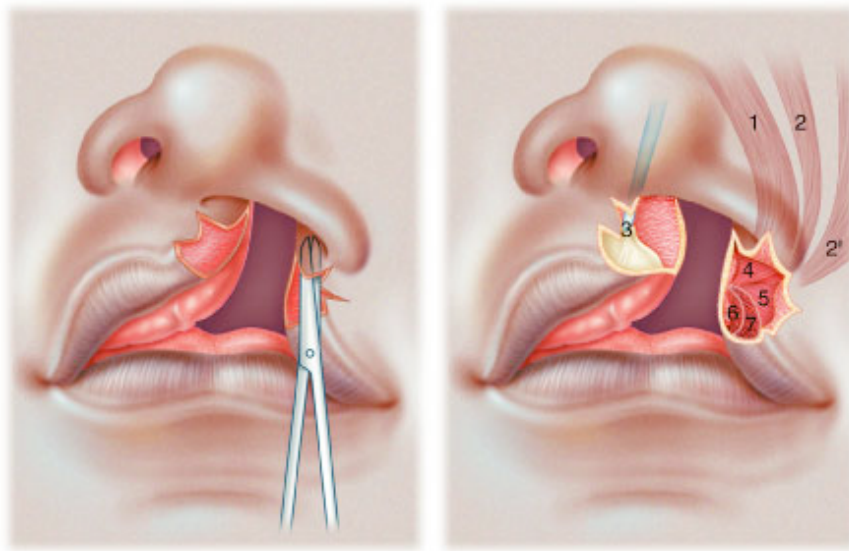
Incisions of the mucocutaneous elements



The mucocutaneous elements are incised as shown in the schematic.

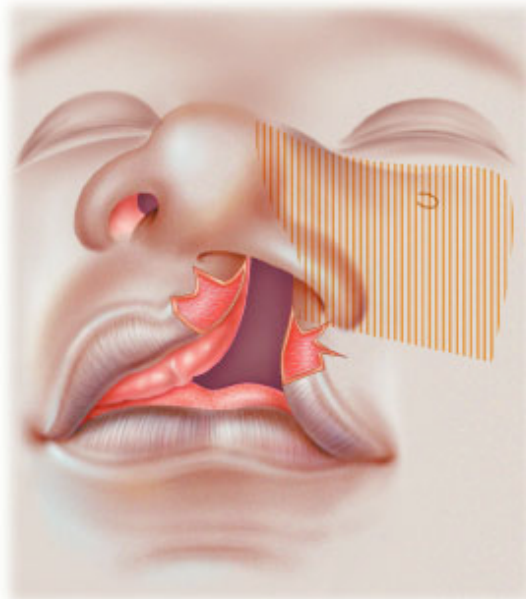
We recommend a small lateral triangle above the vermilion-cutaneous roll if the skin is badly retracted and the roll is not very pronounced. The size of the triangle will be a function of the difference in height between the cleft and the noncleft side.

Tracing the muscles



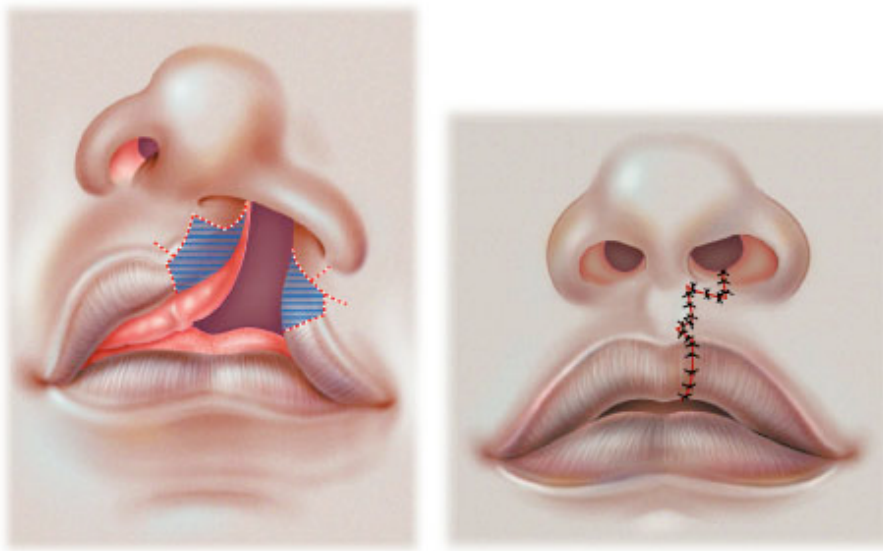
- 1: Schematic representation of the transverse nasal muscle.
- 2: Schematic representation of the levator labii superioris alaeque nasi muscle.
- 2': Schematic representation of the levator labii superioris muscle.
- 3: Cartilaginous septum.
- 4: Lower end of transverse nasal muscle exposed during dissection.
- 5: Marginal part of orbicularis oris muscle.
- 6: Depressor septi nasi muscle.
- 7: Labial part of orbicularis oris muscle.

Release of nasolabial muscles



This release is performed in the subperiosteal plane, from the nasal bone and the infraorbital margin (below the infraorbital foramen) to the zygomatic process of the maxilla.

Suturing the mucocutaneous elements



In conclusion, we recommend

- treating an incomplete unilateral cleft like a complete cleft;
- treating a bilateral cleft using the same principles as those described for the management of a unilateral cleft, and applying these principles to both clefts. It must, however, be borne in mind that the prolabium is devoid of muscles.

PATIENT EXAMPLES



Naso-labio-palatine residual deformities in a young Indian girl who had been operated on in childhood, for left-sided cleft lip and palate. Before and after a Delaire revision.



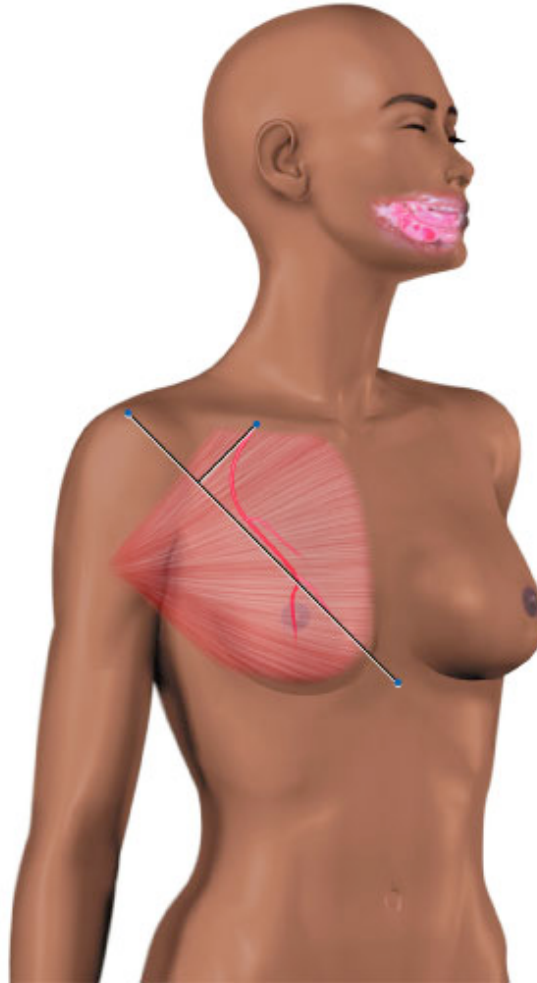
Right-sided cleft lip in a child from Togo (Interplast-France mission). Before and after a Delaire repair. The Delaire is a modification of the Millard technique (large rotation-advancement flap).

The pedicled pectoralis major flap

Indications

The main indication for this flap, in surgical mission practice, is facial reconstructive surgery. In the management of trauma, cancer, and the sequelae of cancrum oris (noma), the pectoralis major flap has proved to be a reliable means of bringing skin and muscle to a facial site. When tunneled subcutaneously, it will produce minimal scarring on the front of the chest, which is important in Africa, where keloid formation is common. The skin paddle may be harvested in the inframammary fold, so as to produce even fewer visible scars. The flap is raised on a pedicle, which needs to be "slid" to its destination, underneath the skin of the neck and the face (in the plane used for face lifts). Some surgeons bring the pedicle to the outside, so as to reduce compression on the tissue and thus to improve its chance of survival. The procedure is comparatively easy to teach, but requires good visualization of the pedicle during surgery, and, therefore, good lighting. (This may be a problem in some theatres; also, remember to take a pocket torch, so as to have a light source in the event of a power cut.)

Principles: Flap pattern and landmarks



The patient is positioned supine.

To find the course of the main vascular pedicle, draw a line from the acromion to the xiphoid process. Next, draw a line a right angles to the first line, starting from the mid-point of the clavicle. However, the true course of the vascular pedicle can be established only at surgery, when the skin paddle has been raised and the underside of pectoralis major has been reached. At this stage, the course of the vessel can be established with certainty, and the incisions on either side of the intended pedicle can be determined more accurately.

Flap dissection



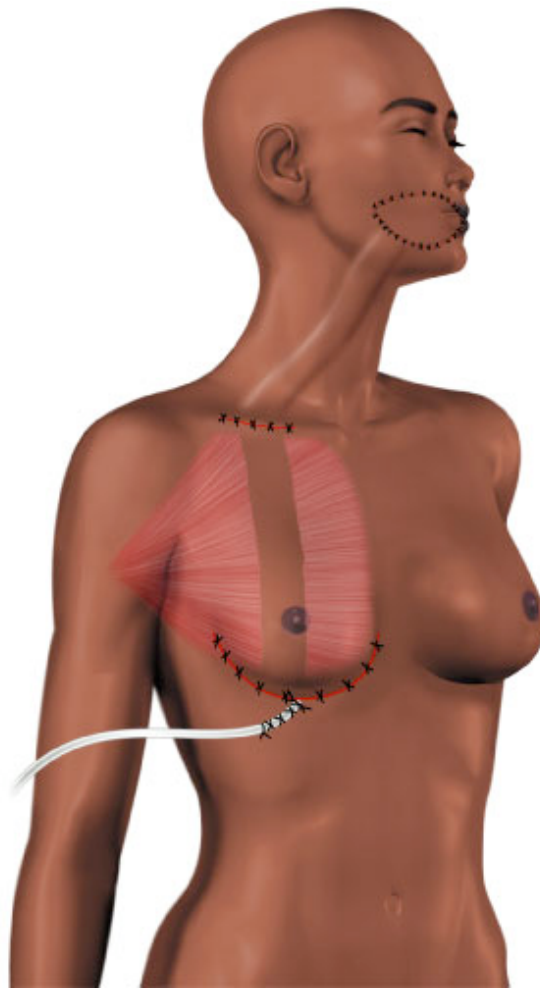
After the raising of the skin paddle, the lower border of the muscle is identified, and the space underneath the muscle is entered. Blunt finger dissection is readily performed between the muscle and the rib cage. The vascular pedicle must be identified on the undersurface of the muscle. The anterior aspect of the muscle is dissected free; working in this plane is very straightforward.

Dissection of the pedicle



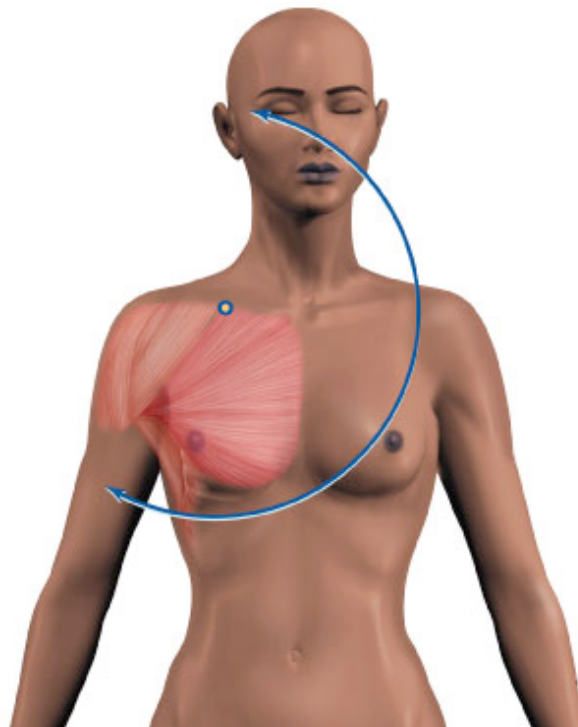
Once the axial pattern has been determined, the muscle is incised on either side, to form a strip all the way up to the clavicle (which is the pivot point). The strip is brought out through a skin incision made along the clavicle.

Tunneling the flap



The flap is taken through beneath the skin of the neck and the face, to its intended site in the face. Care must be taken to avoid pedicle compression by too narrow a tunnel.

Arc of rotation of a pectoralis major flap



PATIENT EXAMPLE



Young girl from Togo, with facial sequelae of noma. The cheek defect was reconstructed using a pedicled myocutaneous pectoralis major flap (Interplast-France mission).

The pedicled latissimus dorsi flap

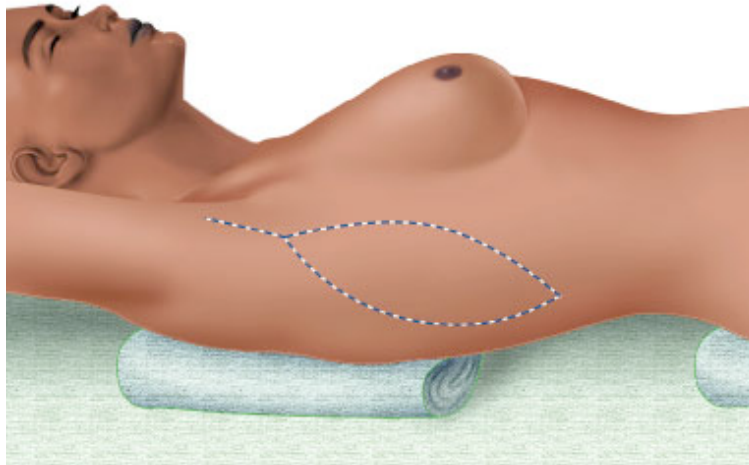
Indications

The latissimus dorsi flap, in its pedicled form, is very reliable and has a long “reach”. It can be used to transfer a considerable amount of muscle and skin. It can reach the face; however, in order to get there, its pedicle may “bowstring”, and considerable subcutaneous dissection may be required in order to take it to its destination without causing contracture. Reaching the anterior aspect of the chest, the upper abdomen, the back, and the upper limb (to the level of the elbow) is also straightforward. As a free flap (with microsurgical anastomosis), it can be done, even under challenging conditions, using magnifying loupes (x3.5). The free flap has the advantage of allowing a customized transfer of different tissues; however, it also has the disadvantages inherent in any microsurgical procedure, especially since the result will be less predictable in sickle cell anaemia patients (since free flaps are not very tolerant of tissue anoxia).

Principles

The latissimus dorsi flap may be muscular or myocutaneous. The principles of harvesting are the same. However, for the myocutaneous flap, the muscle has to be harvested with an overlying skin paddle.

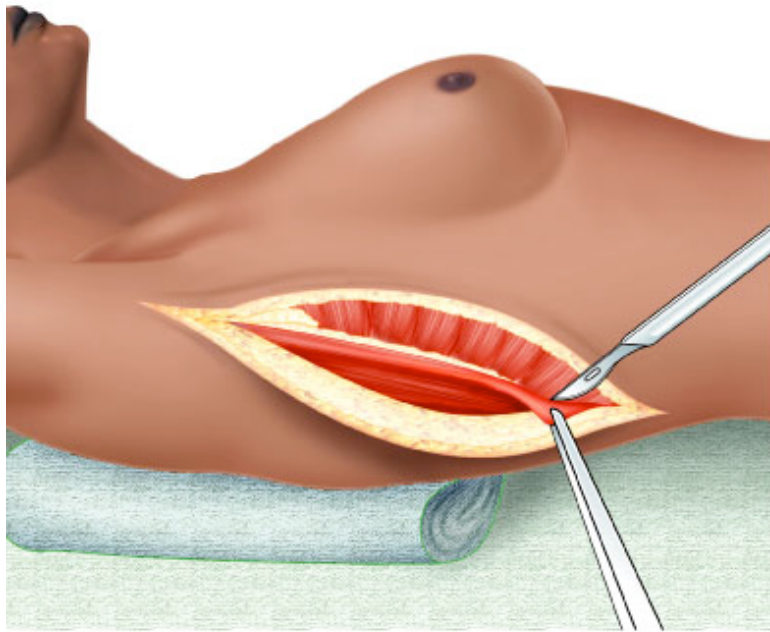
Patient positioning



The patient is positioned supine, with a rolled towel under the shoulder and the buttock. The arm may be included in the operative field, or placed on an armboard. The axilla must be fully accessible, to allow dissection of the throacodorsal vascular pedicle.

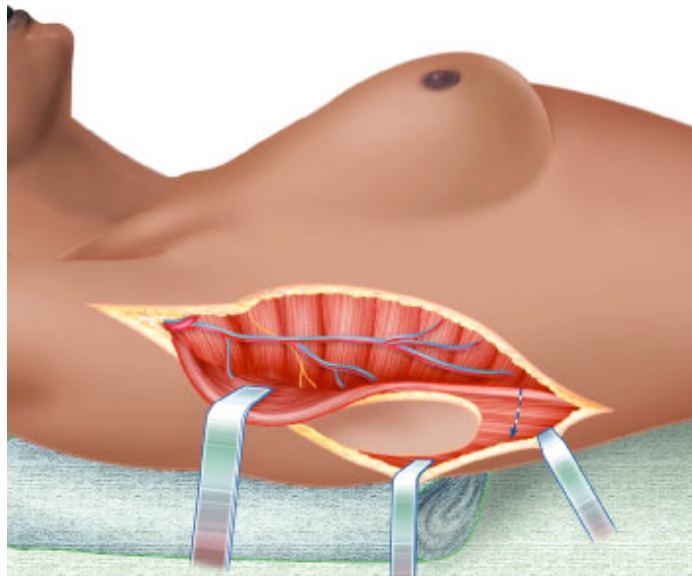
The drawing shows a myocutaneous latissimus dorsi flap, with the skin paddle outlined.

Dissection of the flap



The incision is made over the anterior border of the latissimus dorsi muscle. The border is identified, and the anterior aspect of the muscle is exposed. Detachment by finger dissection is straightforward, and allows the vascular supply of the muscle coursing beneath the fascia to be displayed.

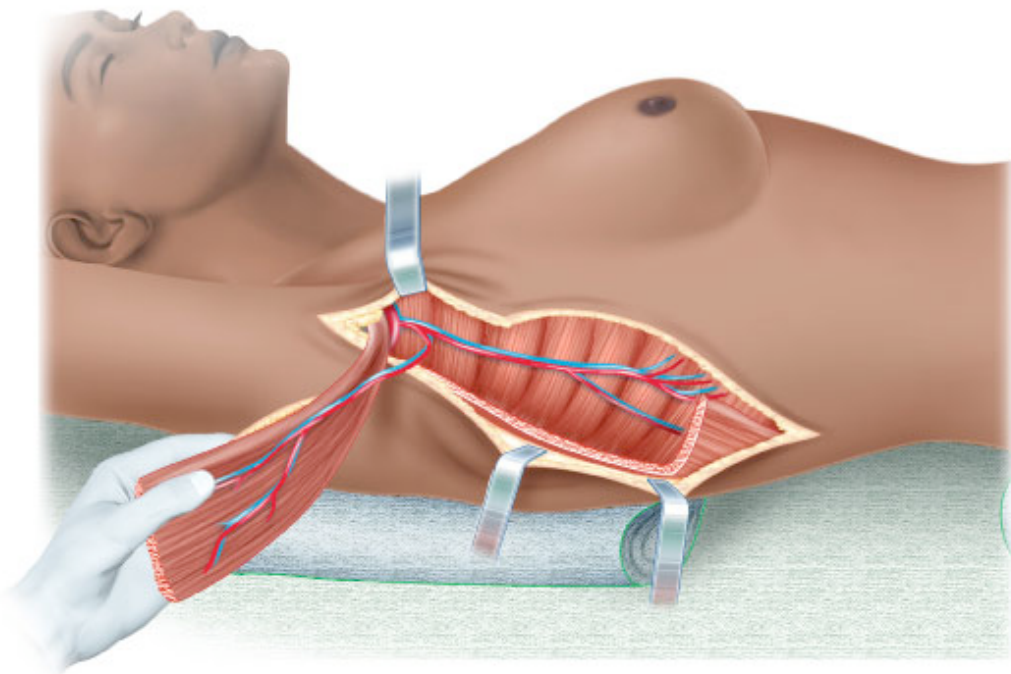
Division of the muscle



Once the vascular pedicle has been identified, the muscle may be divided, to produce an axial-pattern flap.

The deeper layer in the drawing shows the supply to the serratus anterior muscle, which, if required, may be harvested at the same time as the latissimus dorsi flap.

Dissection of the pedicle

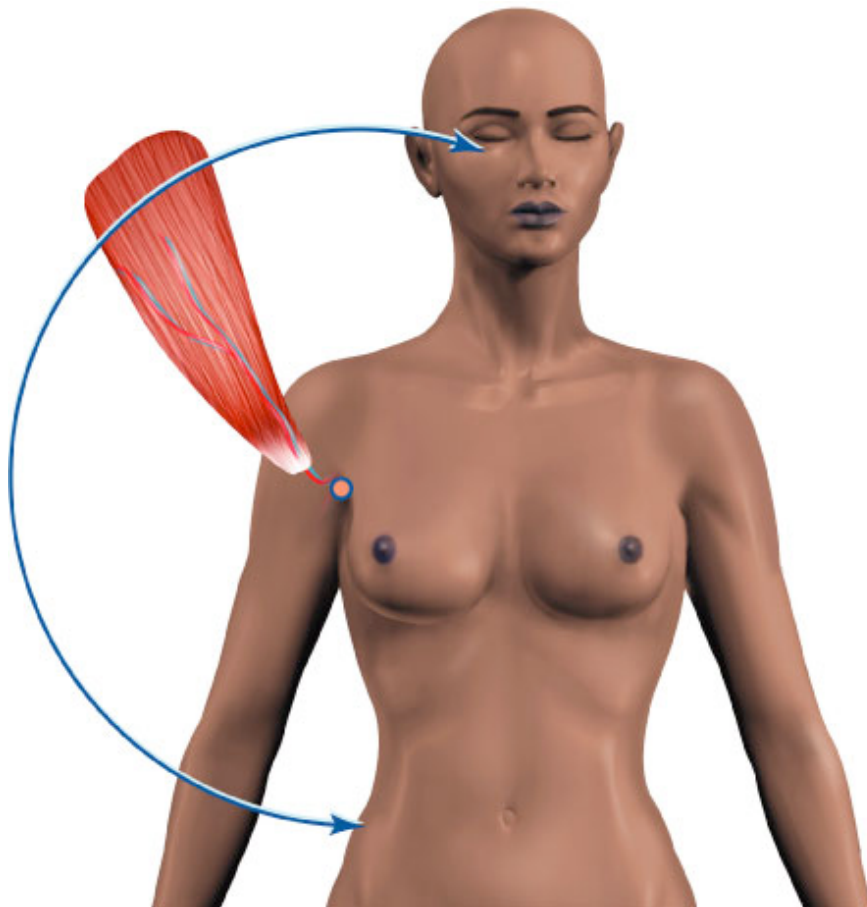


For maximal flap mobilization, dissection of the pedicle should be carried as high up as possible.

The vascular pedicle to serratus anterior is ligated. The drawing shows the supply to latissimus dorsi and serratus anterior to come from a common trunk.

For greater ease of flap mobilization, the tendinous insertion on the humerus may be divided.

Arc of rotation of a latissimus dorsi flap

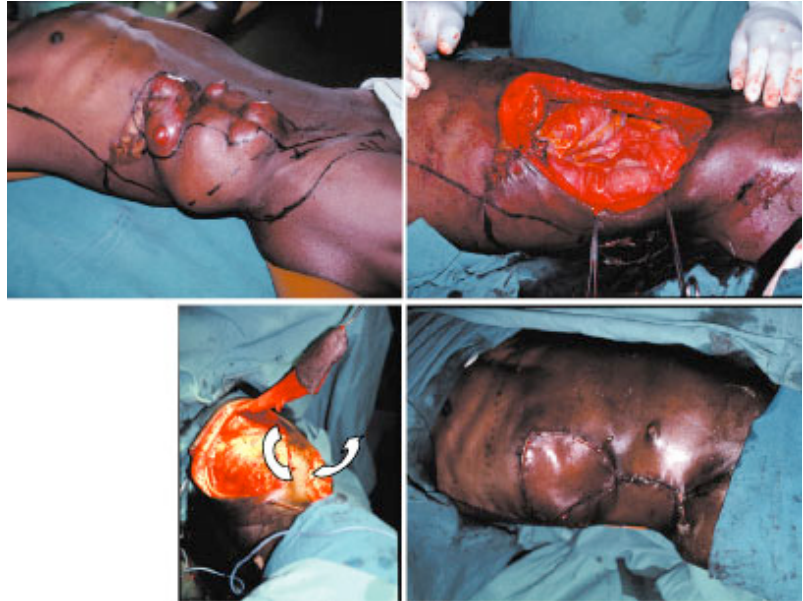


PATIENT EXAMPLE



Young Nigerian male, with burn scars of the right elbow. After elbow release, the defect was covered with an ipsilateral myocutaneous latissimus dorsi flap.

PATIENT EXAMPLE



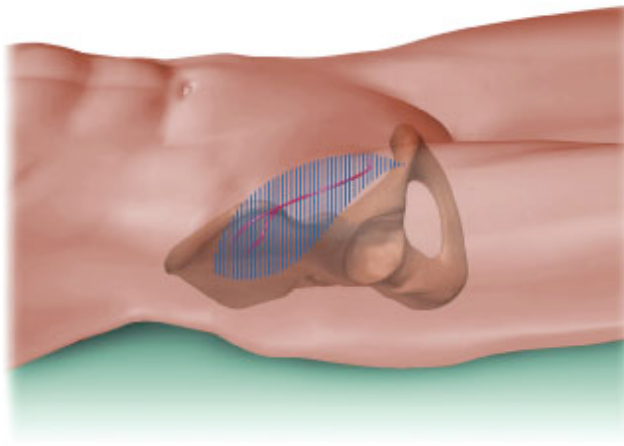
Man from northern Togo (Afagnan), with a large abdominal tumour. Defect repair required an ipsilateral pedicled latissimus dorsi flap

The pedicled groin flap

Indications

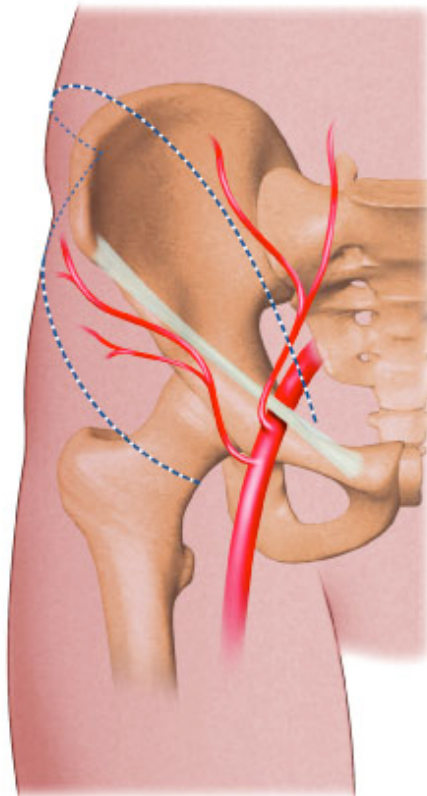
Knowing this flap is essential. Together with the Z-plasty and the latissimus dorsi flap, it is “the” technique that any surgeon must master. It constitutes a reliable means of covering defects in the hand and the forearm, even if there is local infection. However, it does require a second operation for the detachment of the pedicle. This operation, which is performed between two and three weeks after the first session, can be readily explained to the local team, who will need to do the release. We would, however, recommend that these flaps be scheduled early on during the mission, so as to enable the visiting surgeon to perform the release before his or her return home.

Principles: Patient positioning



Supine, with a small towel under the ipsilateral buttock. The skin paddle is designed over the vascular pedicle.

Landmarks

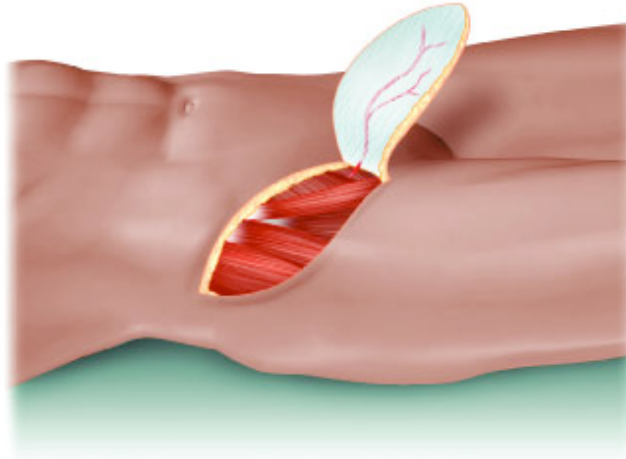


Landmarks:

- 1) Superficial circumflex iliac artery. This vessel comes off the femoral artery, 1 to 3 cm below the inguinal ligament.
- 2) Superficial epigastric artery.
- 3) Anterior superior iliac spine (ASIS).
- 4) Pubic tubercle.

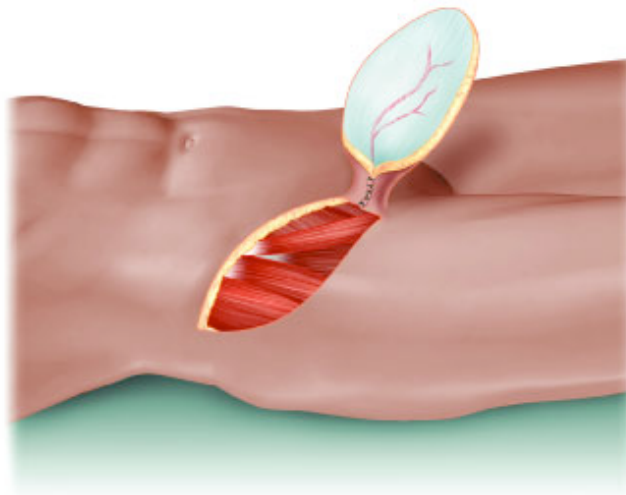
In practice, a line can be drawn from the ASIS to the pubic tubercle. One third of the skin paddle should be drawn above this line, and two thirds below.

Dissection of the groin flap



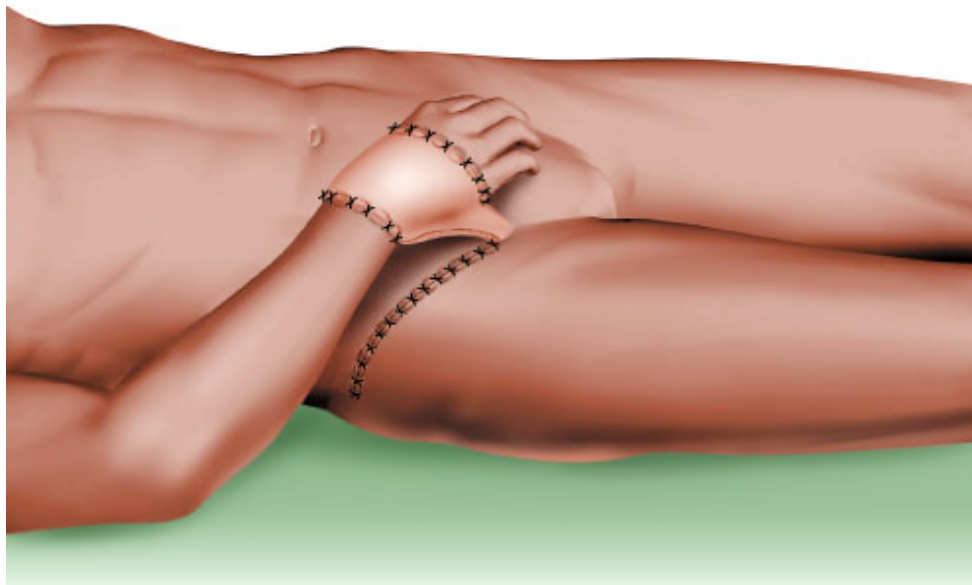
Dissection is started at the distal end of the skin paddle, since that makes it easier to find the plane of dissection over the aponeurosis. Next, the dissection should be taken underneath the sartorius fascia, so as to keep the vascular pedicle in the flap. Also, the dissection should stop short of the femoral artery, so as not to sever the vascular pedicle of the flap.

Tubing the groin flap



Tubing: This is done to fashion the bridge segment into a "trunk" - an idea that goes down very well in Africa. This pedicle allows better mobilization of the hand, and makes dressing easier. However, the patient, his or her family, and the paramedical staff may find this technique slightly disconcerting, and will need lots of explanations.

Dressing



We feel that there is no need for a special dressing, and prefer to leave the arm exposed. All that is required is to explain to the patient (and the nursing staff) that the whole thing is "sound" and will not "pull out" while the patient is asleep. The patient must be reassured that the sutures will hold. We have given up using complicated bandages on the arm and the hand. We do not recommend stout sutures between the skin of the abdomen and the hand, to relieve any tension by the hand on the sutures. The best immobilization is an explanation of the procedure and of the "construct". We do, however, use a small dressing to allow the wrist, the elbow, and the shoulder to be mobilized daily. We still remember the patient who, frightened by the operation, had kept her arm "still" for a fortnight. By the end of that time, her nails were dug into the skin of the abdomen, and her shoulder had gone stiff.

PTIENT EXAMPLE



Young woman from Togo, with sequelae of infection of the dorsum of the right wrist. As a child, she had had an injury treated by the application of "herbs" by a local healer; this had led to major infection of the local tissues. She had since grown up with the back of her wrist "stuck" against her forearm. We excised the scar band on the dorsum of the wrist and performed joint release. The defect on the dorsum was covered with an ipsilateral groin flap.

CONCLUSION

Plastic surgery under challenging conditions means doing reconstructive surgery under difficult circumstances, in developing countries. All aspects of plastic surgery come into this work, and surgeons going on missions will need a fairly comprehensive knowledge of the discipline. Having been on a number of surgical missions, we feel that certain techniques are particularly useful. They obviously cannot solve all the problems encountered, but have allowed us to treat the majority of the patients seen on missions. Any surgeon intending to go on a mission should, therefore, be conversant with the Z-plasty, skin grafting, the pectoralis major flap, the latissimus dorsi flap, and the groin flap. Plastic surgery travels well and can be practised under all manner of circumstances.

Surgical missions involve a visiting team working closely together with all the local health care professionals. The ultimate purpose of this cooperation is the training of the local staffs. Any surgeon working on a mission will receive as much as he or she gives. Often, one may feel that what one has to give is so little, seeing how many patients there are to be treated. But remember: the little that remains goes far beyond the things that pass.

Have a good mission.

RECOMMENDED READING

Before going on a mission mainly concerned with hand surgery

- do consult **Green's Operative Hand Surgery**, D.P. Green, R.N. Hotchkiss and W.C. Pedersen (eds) (Churchill Livingstone, Edinburgh, 1999) in two volumes – which, unfortunately, is too heavy to take on the trip.

- **La main traumatique**, by M. Merle and G. Dautel (Masson, Paris, 1992). Vol. I covers emergency surgery. It is useful for technical aspects of hand and finger surgery, and for a description of flap patterns.

Vol II deals with revision surgery and wrist trauma. It is a useful textbook for tendon revision surgery (something frequently needed on surgical missions) and for tendon transfer techniques (for use in old trauma cases, leprosy, etc.).

If the mission is going to be mainly concerned with noma surgery, we recommend

- for nasal reconstruction, **La réparation des pertes de substance du nez chez l'adulte**, by M. Revol, D. Guinard, J. Bardot and M. Texier. Report of the 38th Congress of the French Society for Plastic, Reconstructive and Aesthetic Surgery (Masson, Paris, 1994).

- for the reconstruction of the orbit and the eyelids, **Plasties et Reconstructions orbito-palpébrales**, by D. Montandon, G. Maillard, S. Morax and L. Garey (Médecine et Hygiène, Geneva, 1988).

- for lip reconstruction, **Chirurgie des lèvres**. Monographies de chirurgie réparatrice. J. Lévignac (ed) (Masson, Paris, 1991).

If the mission is going to be mainly concerned with cleft surgery, we recommend

- **Chirurgie des lèvres**. Monographies de chirurgie réparatrice. J. Lévignac (ed) (Masson, Paris, 1991). *Whatever the nature of the plastic surgery mission, we recommend*

- **Flaps in Limb Reconstruction**, by A. Masquelet and A. Gilbert. Martin Dunitz, 1995.

Useful Internet Sites

Interplast – France: <http://monsite.wanadoo.fr/interplast>

Weather: www.meteo.fr/meteonet

Diplomatic Affairs: www.diplomatie.gouv.fr/voyageurs

Health Advice: www.traveling-doctor.com

Hand Injury Centre at the European Hospital Georges Pompidou, Paris: www.sos-mains.com

French Society for Plastic Surgery: www.plasticiens.org

Patrick Knipper's Web site: www.docteur-knipper.com

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