

**Bilingual**  
**Essential Plastic Surgery**

**基础整形外科学**  
**(英汉对照)**

**A Textbook for Chinese Medical Students**

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上海科学技术文献出版社

1992

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## 序 言

在我国，作为一门修复人体残缺畸形，恢复形态和功能的新学科，整复外科这门专业近年来日益受到医学界和社会的重视，并造福于广大伤残病员。目前，整复外科不但早已成立了全国性专科学会，各省市分会，出版了全国性专业杂志，而且专业队伍不断扩大，专业水平日益提高，成绩斐然，已在国际上树立了较高声誉和学术地位。但整复外科这门新专业犹未正式列入我国高等医学教学计划中，成为一门独立的必修课程，这不能不说是一件憾事。

上海第二医科大学自1986年开始，在医疗系正式成立了整复外科教研室，每年对医疗系，儿科系医学生各进行十几学时的整复外科教学内容，并安排了见习和实习。这是我国高等医学教育系统中第一个整复外科教研室。八年以来，由于教研室全体成员的努力，获得了较好的教学成果，受到了学生们热烈欢迎，以致历年来整复外科一直是班级中最优学生毕业后首选的专业之一。这使我们感到兴奋和欣慰。

在几年的教学过程中，我们曾集体编写了整复外科中文讲义，作为学生学习的依据；后来又由于英语班的特殊需要，由关文祥教授为主执笔编写英文讲义，现在又应读者要求翻译成中文，作为英汉对照本正式出版。它具有内容全面，简明扼要，文笔流畅，图文兼备，深入浅出，易于理解等特点，既可对学生们传授整复外科最基本的理论和技术，又可作为学习和熟悉英语专业名词之用。我认为本书不但可供医学生学习整复外科之用，亦可作为从事本专业青年医师们学习英语之需，一举两得，诚属可贵，但仍希得到各方指正，俾臻完善。

张涤生

1992年8月14日

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## Foreword

This little book is specially written and edited for the Chinese surgeon on the threshold of a career in plastic surgery. It is written and edited by the authors in English and Chinese, the first of its kind. The authors are senior plastic surgeons working at the world famous 9th People's Hospital, Plastic Surgery Department, Shanghai. I have been to this hospital. The clinical material coming from a catchment population of 11 million people is varied and simply overwhelming in numbers. The vast clinical experience of the staff is beyond any doubt.

The first author is himself a transplant. He was born and educated in Malaysia but he has made Shanghai his home. Therefore he is effectively bilingual. This book is brief and to the point. It covers the major spectrum of the practice of plastic surgery. It is current and it is aimed at the Chinese audience. Some of recent procedures now in use in the West are omitted. They will no doubt find their way in with subsequent editions of this book. The authors are very experienced plastic surgeons with a love for the plastic surgery literature. They have distilled their wisdom and experience in this little book. It is a good book full of useful practical information, at a reasonable size and price and, it is well worth reading. I strongly believe that its rightful place should be on the study desk of every young Chinese plastic surgeon.

Khoo Boo-Chai M.D.  
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## (中译文)

这本薄书是专为刚刚开始搞整复外科的中国外科医生编写的。用英汉对照来编写，这是第一本。作者是在世界著名的上海市第九人民医院整复外科工作的高级整复外科医生。我曾经到过这所医院。这些来自汇聚一千万人口的临床资料是丰富多样的，数量上是极可观的。该院工作人员具有丰富的临床经验是不容置疑的。

第一作者本人是一名移居者，出生在马来西亚并在那里受教育，但已在上海安了家。因此他能有效地使用两种语言。这本书是简短而得要领，概括了整复外科实践的主要范围。它语言流畅，是针对中国读者而写的。有些目前在西方应用的方法被省略了，无疑在再版时会加进去。作者是很有经验的整复外科医师，喜爱整复外科文学，在这本书里倾注了他们的智慧和经验。本书是一部充满实用信息的好书，篇幅适中，价格合理，值得一读。我坚信每一位年轻的中国整复外科医生的书房桌上，都应有它的位置。

上海第二医科大学客座教授

邱武才

1992年9月

新加坡 (关建中译)

## 作 者 的 话

本书原系上海第二医科大学医疗系英文班试用教本，1989年试用以后，有读者建议翻译成中文，以便更有助于他们学习整形外科专业英语。另外，作者用英语授课时，发现许多学生忙于抄录中文解释，忽视听力训练。基于上述两点，作者认为有必要将原英文试用教本全部翻译成中文，并加注释，以英汉对照本正式出版，供参考。

整形外科是外科中一新兴专业，二次世界大战结束后迅速发展起来。我国也只在解放后始有此专科设置。但“文革”中几遭扼杀，“文革”后才重获发展机会。近年来更成为许多医师争相学习的热门专业。上海第二医科大学适时在医疗系中设置整形外科课程，实为普及本专业知识和培养本专业后备人才的明智之举，作者表示钦佩。

我国实行对外开放政策后，国外整形外科专家和同行不断来访和交流，国内专家也有机会经常出访和参加国际会议，多数情况下是用英语交流的。国外许多权威性整形外科参考书和刊物，也多用英文撰写的。更有甚者，目前国内本专业的中文参考书还很少。因此，作为一名整形外科医师，如能掌握本专业的英语，必然好处很多。作者有鉴于此，在编写过程中，尽量把整形外科的基本内容都包括在书中，实际上已超出授课时数所限的范围，目的是让本专业的中青年医师，或其他专科想学本专业的医师，能在较短的时间内掌握较多的本专业的英语词汇和术语。

本书的英文部分承著名整形外科专家张涤生老师逐句审校并写序言，新加坡整形外科专家邱武才客座教授也参与审校，上海第二医科大学薛纯良副校长及上海第九人民医院领导的关心和支持，干季良和商庆新两位医师参加部分章节初译，张旦昕同志对专业性较强的词汇作中文注释，上海第二医科大学印刷厂的同志精心排印，王正明等同志绘图，上海科技文献出版社的热情帮助，作者在此表示衷心感谢。最后，错误在所难免，恳请读者及前辈们指正。

关文祥 钱云良

1992年8月18日

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# CHAPTER 1

## Brief Introduction and History of Plastic Surgery

What is plastic surgery? It is a specialised branch of surgery. The plastic surgery techniques are most often applied to the skin and soft tissues, and less often to the underlying musculoskeletal framework. Because of the special nature of plastic surgery, it is largely concerned with form, as is implied in the term "plastic".

Von Graefe was the first to employ the term "plastic" in his monograph entitled "Rhinoplastick" published in Berlin in 1818. In most countries now, the term "plastic surgery" designates the specialty.

Functional aspects of plastic surgery are also important, for example, reestablishing the continuity of the mandible to permit mastication, restoring the function of the hand etc. Now, a new nomenclature has been given to this specialty as "plastic and reconstructive surgery".

Until the end of the nineteenth century, plastic surgery was essentially reconstructive. With the perfection of techniques, the correction of minor defects that were congenital in nature or secondary to aging came to be practiced. This corrective or esthetic surgery in contradistinction to reconstructive surgery becomes the new challenge to the plastic surgeon. Actually, no clear distinction can be drawn between the two types, because there is an esthetic aspect in reconstructive surgery and often a reconstructive aspect in esthetic surgery.

The plastic surgery being established as a branch of surgery began less than 50 years ago, but the practice of plastic surgery techniques can be traced back to long ago in ancient time. For example, in India, Sushruta, the Hippocrates of the sixth or seventh century before Christ, described operations for the reconstruction of the nose (now known as the Indian method). Amputation of the nose was a common practice to punish criminals and the inhabitants of conquered cities. Celsus (625 to 690 A. D.) may be considered one of the originators of plastic surgery as we know it today. He described procedures varying from the treatment of nasal and jaw fractures to operation for hypospadias. During the first half of the fifteenth century, plastic surgery came to be practiced in Sicily by members of the Branca family. Antonio Branca, the son, abandoned the ancient Indian method and was probably the first to use a flap from the arm to repair mutilated lips and ears.

During the sixteenth century, in the region of Calabria in the southwestern part of the Italian peninsula, a number of other practitioners appeared to have repaired mutilated noses. Among these, the work of Gaspare Tagliacozzi of Bologna, who laid the cornerstone of modern plastic surgery, particularly in nose reconstruction, was renowned throughout Europe. His treatise "De Curtorum Chirurgia per Insitionem" was published in 1597. In describing the technique of preparing the arm flap transplantation to reconstruct the nose, he specified the delayed flap which is so important and still in use today. His technique is now known as the Italian method of nasal reconstruction.

Then came the decline of plastic surgery in the seventeenth and eighteenth centuries. The greatest hindrance to the acceptance and use of plastic surgical operations came from a misconception that reparative tissue could be taken from a slave or person other than the patient.

During the first half of the nineteenth century Labat (1834) and Blandin (1836) wrote the first treatise on plastic surgery in France. The names of two great surgeons of the nineteenth century should not be omitted: Dupuytren, particularly for his operations for Dupuytren's contracture and his classification of burns according to their depth, and von Langenbeck, who succeeded Dieffenbach, for his contribution to cleft palate and jaw surgery. During the remainder of the nineteenth century, hundreds of papers appeared on the subject of plastic surgery, e.g. Zeis's *Handbuch der Plastischen Chirurgie*, published in 1838; Jobert's *Traite de Chirurgie Plastique*, published in 1849.

In 1869 Reverdin, before the Imperial Society of Surgery of Paris, reported the hastening of the healing of granulating wounds by what he called "epidermic" grafts. The technique of skin grafting was further developed when Ollier in 1872 described the clinical application of dermoepidermic graft 4 by 8 cm in size. Thiersch (1874) advocated the use of larger sheets of dermoepidermic grafts to cover wounds, now designated as "Ollier-Thiersch" grafts. Lawson (1870), Lefort (1872), and Wolfe (1876) described the use of a full-thickness graft for the treatment of eyelid ectropion.

The first American textbook "Plastic Surgery—Its Principles and Practice" by Staige Davis, was published in 1919. World War I appears to have been the crucial starting point for the development of the concept of plastic surgery which we know today. One can consider, therefore, that World War I was the beginning of the era during which plastic surgery became a surgical speciality. After the war, national and international congresses began to include in their scientific programs papers concerned with the methods of treatment of the victims of the war and demonstrating new surgical possibilities. Then one may consider that World War II marks the beginning of the period of healthy adolescence, the period of 25 years

extending from 1914 to 1939 then represents the period of growth.

In the 1920's and 1930's three personalities—John Staige Davis, Vilray Papin Blair, and Harold Delf Gillies—helped to shape the present concepts of plastic surgery as it is practiced in the English-speaking world. A significant surgical contribution by Staige Davis was "the small deep skin graft" often referred to, particularly in foreign countries, as the Davis graft. Many of Davis papers remain classics even today. Among these are his papers concerning the theory and practical applications of the Z-plasty (1931), which he referred to as the "Z-incision".

Blair and Gillies had a profound influence on the development of plastic surgery, not only in English-speaking countries but also throughout the world at large. Gillies developed the tube flap, coincidentally with Filatov (a Russian in 1917), and showed many applications of the new technique in his book "Plastic Surgery of the Face" (1920). Blair defined the process of delay in nontubulated flaps in his paper, "The Delayed Transfer of Long Pedicled Flaps in Plastic Surgery" was published in 1921.

The development of the technique of split-thickness skin grafting and the paper on the subject by Blair and his pupil Barrett Brown (1929) constitute a landmark in the history of skin grafting. To facilitate removal of the split-thickness skin graft, Blair developed a special skin grafting knife and the Blair suction box, which, connected with a negative pressure apparatus, facilitated traction of the skin and flattening of the donor area during the cutting of the graft.

Skin grafting was greatly facilitated by the development of the dermatome by Earl C. Padgett and George F. Hood, the latter a mechanical engineer. Padgett described the three-quarter thickness skin graft, with qualities comparable to those of a full-thickness graft in 1939.

Since World War II the scope of plastic surgery has changed. During this conflict it was necessary to treat a great many complicated fractures, to replace lost structures, to treat paraplegic pressure sores, frostbite, and burns etc. Impetus was given to the development of surgery of the hand and the treatment of burns, as well as research in tissue transplantation. Special centers, like burns center, jaw center, hand surgery center were established in strategic locations in Britain, Western Allies and United States. As its scope increased over the years, the training of plastic surgeons had to be extended. The additional training entails extensive experiences in the basic disciplines primarily those of general surgery.

Ten years after the end of World War II, in 1955, the International Association of Plastic Surgeons was organized under the aegis of Tord Skoog and held its first International Congress in Stockholm.

Plastic surgery today offers a wide field for research in transplantation, implantation, genetics, growth and development, speech pathology and the newer



fields of microsurgery and craniofacial surgery pioneered by plastic surgeons.

Plastic surgery in China took a somewhat similar course of development to that of the world (or the West). It is one of the youngest branches of surgery starting only from late 1940s. But, as with plastic surgery abroad, the practice of plastic surgery techniques can also be traced back to ancient China. Cleft lip repair could be traced well back to Jin Dynasty, (晋朝) A.D. 265-419, and was quite a common practice in Tang Dynasty (618-907) (唐朝). According to a book named "The Chronicle of Tang Poems" (唐诗记事), one doctor had repaired more than ten cases of cleft lip and among these patients was a poet named Fang Gan Zeng (方干曾) who had passed the qualifying examination for officers but was not enrolled because he had a hare lip deformity. Fang therefore led a miserable life until old age when he had a chance to meet a doctor who finally repaired his hare lip.

Other stories of plastic surgery were also chronicled, e. g. "Collection of Bizarreness" (集异记) documented removal of nasal tumor with acupuncture for cosmetic reason, and "Comprehensive Chronicle of Peace Age" (太平广记) recorded elimination of ear tumor with moxibustion (艾绒灸治).

Modern history of plastic surgery in China began in early 1940s (in the later part of China's Anti-Japanese War) when a young Chinese surgeon was sent by the then Chinese government for training in plastic surgery under guidance of Robert Ivy in the United States. In 1947, an American plastic surgeon, Dr. Webster, came to Shanghai and ran a short-term training course of plastic surgery and twelve young Chinese doctors attended it. Around middle of 1940s, a few young Chinese doctors also went to study plastic surgery in the United States. Most of them came back just before the founding of New China and practised plastic surgery in their resident cities.

However, plastic surgery in China took shape of surgical branch only after the founding of the People's Republic of China, especially after the eruption of Korean War (1951) when many wounded soldiers from both sides urgently called for plastic surgeons' service. The following years saw the establishment of a few small plastic surgery departments in some comparatively well-equipped hospitals in Beijing [The department in the Third People's Hospital of the then Beijing Medical College, headed by Professor H. Y. Zhu (朱洪荫)], Shanghai [The department in the then Guang Ci Hospital of Shanghai Second Medical College, headed by Professor T. S. Chang (张涤生)], Xi'an [The department in the Fourth Military Medical University, headed by Professor L. N. Wang (汪良能)], etc. In 1957, the Beijing Plastic Surgery Hospital [headed by Professor R. Y. Song (宋儒耀)], the first of its kind in China, was established in the capital of China. Of course, at that time plastic patients were not numerous as they are now and each year only a limited number

of new plastic surgeons were produced in the above mentioned hospitals and departments.

Well, with the accelerated modernization of industry and transportation, more of much complicated traumatic cases were seen. Especially with the rapidly improved living standards of Chinese people, the demands for plastic surgery became greater and greater and the shortage of plastic surgeons reached a state so serious that the problem prompted the Ministry of Health of China to appoint in 1973 two major national training centers for plastic surgeons in Beijing (Beijing Plastic Surgery Hospital) and Shanghai (The Plastic Surgery Department of Ninth People's Hospital). With these two major centers, as well as many more other small departments as bases, more and more plastic surgeons have been trained each year and their number has now amounted to several hundreds. They are distributed in all (except Tibet) provinces over the country and are taking care of the local plastic patients. In 1985, the Chinese Association of Plastic Surgery was established in Beijing with about 300 members (the number has increased to over 500 at the moment). However, this figure of plastic surgeons is still quite small when compared to a population of more than one billion in our country, or when compared to the numbers of plastic surgeons in the United States (over 5000) and Japan (over 3000). Therefore, China is still badly in need of more new plastic surgeons now and you are assured of welcome to joint us.

# CHAPTER 2

## The Scope and Basic Techniques of Plastic Surgery

### The Scope of Plastic Surgery

The scope of plastic surgery has been expanded in recent years and can be summarized as follows:

#### 1. Congenital Deformities

There are many congenital deformities in the human body. Only some of them need correction or can be corrected by plastic surgery. For example, cleft lip and palate, craniomaxillofacial anomalies (hyperteriolism, Crouzon syndrom etc.), lop ear, wryneck, bifid nose, congenital hand deformities (polydactily, syndactily, club hand etc.), congenital genitalia deformities (hypospadias, absence of vagina, harmaphrodism[etc.]) and congenital deformities of lower extremities, etc.

#### 2. Acquired Deformities or Defects

Most of them are caused by industrial injury (avulsion, crush), traffic accidents, thermal or chemical burn, cold injury (frostbite), electric or radiation injury, etc.

#### 3. Deformities or Defects Resulting from Excision of Tumors

Tumors themselves may seriously destroy tissues and cause severe deformities. Excision of them causes an even larger deformity. Clinically, tumors are of two types, i. e. malignant tumors such as squamous cell carcinoma, basal cell carcinoma, fibrosarcoma, etc. and benign tumors such as hemangioma, lymphangioma gigantic nevus, neurofibroma, etc.

#### 4. Deformities or Defects Resulting from Severe Infection

Infection can be caused by bacteria or parasites. Those caused by bacteria are noma (extensive tissue loss of lips, gums and nose, sometimes even loss of eyes), leprosy, syphilis, etc. Extensive tissue loss may also occur in severe septicemia (especially in severe burn). Infection by filaria (parasite) may result in elephantiasis of the extremities or the genitalia which requires surgical or non-surgical treatment such as heating and bandaging method used in Shanghai Ninth People's Hospital.

#### 5. Deformities or Defects from Other or Unknown Causes

Facial hemiatrophy, facial nerve palsy, pressure sore, venous stasis ulcer of the lower leg, diabetic ulcer of the sole, etc.

#### 6. Cosmetic (esthetic) Surgery

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Its aim is to correct minor deformities or to make a person look more attractive or younger than his or her real age.

## **Basic Techniques of Plastic Surgery**

### **1. Wound Healing**

A wound in its broadest sense can be defined as a disruption of normal anatomical relationships as a result of some type of injury, accidental trauma or surgical incision. The healing process is a series of chemical and physical reactions that are triggered by the occurrence of the wound itself.

Regardless of the type of wound healing, the stages or phases are the same except that the time required for each stage depends on the type of healing. These stages are (1) substrate or inflammatory, (2) proliferative or collagen and (3) remodeling or the maturation stage.

The healing of any wound results in a scar. The more extensive the damage, the greater the scar formation, and a more conspicuous deformity will result.

Wounds heal by contraction and by epithelialization. Wound contraction is the process by which the edges of a wound are drawn toward each other by myofibroblasts in the base of the wound. Epithelialization is the process by which the wound is resurfaced with epithelium that moves in from the edges of the healing wound. Both processes may result in a smaller wound than initially.

Wound contracture is a pathologic process that can result from wound contraction. The degree of contracture depends on the location, size, and shape of the wound. How to minimize this inevitable contracture needs a plastic surgeon's dexterity.

### **2. Placing the Skin Incision**

A skin incision made in plastic surgery should not only give an adequate exposure of the part to be operated, but also should leave a scar that is acceptable to the patient after the wound has healed. Besides, the scar should also not interfere with the function of the operated part. Therefore, placement of the incision deserves special attention.

Generally, the incision should be placed in a skin crease or at least parallel to it, or in a natural junction to distract the eye, or inside the hair line or in the eyebrow, or in a direction that does not interfere with the motion of a joint (usually avoids crossing it in a straight line on the flexion or extension aspect). In the face, the incision should be placed along the Langer's lines (Fig. 1a + b).

The skin incision should be made with a sharp knife. A blunt knife will cause more damage to the wound, resulting in more scar formation. The wound edges should be handled gently with fine instruments. Hemostasis should be thorough, and clamp and tie the bleeding points with as little surrounding tissue as

possible. Avoid prolonged exposure of the wound to dry air which is harmful to tissue cells.

### 3. Suturing the Wound

The needle should enter the epidermis at a right angle to the skin surface and 2 to 3 mm from the wound edge. The needle should travel down through the epidermis, dermis, and a bit of subcutaneous tissue at a right angle to the wound surface. It then exits from the opposite side in the same depth and fashion. The suture is then tied using an instrument rather than fingers. The tension is adjusted so that the epithelial edges are not pinched together but simply lie together, touching each other.

The simple loop suture is the one most commonly used in plastic surgery. It brings the epithelial edges together. Some eversion of the edges (Fig. 2) is preferable to inversion of the edges. Therefore, it is important to take an adequate bite of the subcutaneous tissues so as to push up and slightly evert the epithelial edges. It is sometimes difficult to evert the wound edges. When it is so, a vertical mattress suture may help (Fig. 3). The knot is tied on the side on which suture was begun.

The choice of suture material is a matter of personal preference. The nonabsorbable sutures, such as monofilament nylon and silk, are less reactive to the tissue than are absorbable sutures, such as catgut and the newer synthetic sutures. A fine, strong acceptable suture for use as an interrupted simple loop suture on the face is 6-0 monofilament nylon or silk on an atraumatic cutting needle. A heavier suture (4-0) may be used in areas of the body where the tissues are thicker and under more tension (back, arms, legs).

### 4. Postoperative Care

The wound edges should be kept clean postoperatively, and the sutures should be removed as early as possible. The eyelids heal earliest and the sutures may be removed 48 to 72 hours postoperatively because if removed later than one week, stitch marks will be left permanently on the skin. In contrast, sutures in the leg must be left for about 14 days because at that time tensile strength of the wound can then be adequate.

The sutures should be removed in such a way that the wound edges are pulled together. Since the wound is not strong at this time, it is easy to pull the edges apart. Wounds usually gain their full tensile strength after several weeks.

### Z-plasty

Z-plasty (Fig. 4) is a geometric design involving the interchange of two interdigitating triangular flaps. Each line is drawn like a Z, and each line is equal in length to one another. The angles of the Z runs along the line of contracture or

of the existing scar whose direction is to be changed.

The classic Z-plasty has 60-degree angles that form equilateral triangles on both sides of the central limb. Those triangles are mobilized and elevated. The two flaps are then exchanged in position and sutured in place. With the 60-degree angles, there is a 70% theoretical gain in length of the skin contracture or scar.

The following table shows the relationship between angles and the theoretical gain in length.

Angles of Z-plasty(°)	Theoretical Gain in Length (%)
30-30	25
45-45	50
60-60	75
75-75	100
90-90	120

In actual practice, it is seldom to design an angle less than 30 degrees or greater than 90 degrees, because in the former case, the length gained is so small that is without any merits, while in the latter case, it is difficult or even impossible to interchange the two triangular flaps.

If a greater length gain is desired, one can design a Z-plasty with longer central limb, because with angles constant, the greater the length of the central limb, the greater will be the actual gain in length accomplished by the Z-plasty (Fig. 5a + b).

It should be emphasized that the theoretical gain in length is based on geometrical studies with paper models. In contrast, biomechanical properties of the skin causing its tension to vary from loose, elastic to taut, may not allow surgery to follow such an exact science as mathematics. Gibson and Kennedi have measured the theoretical and actual gain in length in four Z-plasties in human beings. The actual gain in length was either less (14 and 16 per cent less) or more (7 and 27 per cent more) than calculated.

In order to transpose the flaps of a Z-plasty, the skin at the base of these flaps must be loose or elastic enough to be pulled over into its new position. When the skin is contracted in a direction perpendicular to the central limb of the planned Z, then it may be impossible to do a Z-plasty. This occurs particularly following the skin grafting of a burned extremity, when the skin is often very tight.

The Z-plasty is a useful and commonly used technique in plastic surgery. To summarize, it has three major uses.

(1) To increase the length of the skin in a desired direction, such as in scars that cross the flexion crease of the axilla, elbow, fingers, knee or neck; or in scars or congenital skin webs that cross a concave surface, or in U-shaped scars that are

often elevated in the center because of the action of the contracting scar, or in circular scars of the extremities or body orifices.

(2) To change the direction of a scar so that it will lie in the same direction as the skin lines, because a scar in such a direction is less conspicuous.

(3) To rotate the axis of the tissue included in the Z-plasty flaps, e.g. a disfigured corner of the mouth or the ends of the eyebrow can be rotated into a more normal direction by use of the Z-plasty.

Many modifications of Z-plasty have been designed for special uses. For example, W-plasty (Fig. 6a+b) was described by Borges as another method of changing the direction of a linear scar. Zig-zag procedure (Fig.7) is actually a kind of multiple Z-plasties, used usually to improve appearance of long linear scar or a depressed scar on the face. However, the principles and the function of lengthening are the same in the other modifications of Z-plasty.

# CHAPTER 3

## Tissue Transplantation

### Skin Graft and Skin Flap

A free graft is a tissue that has been removed from its original site (the donor area) and transposed or moved to the recipient area. Survival of the free graft depends on the ingress of blood supply from the recipient tissues. The free graft offers the surgeon many options for use in planing and performing a reconstructive operation.

There are as many types of free grafts as there are types of tissues.

#### 1. Free Skin Graft (autograft)

Free skin graft is most commonly used by plastic surgeons, and can be taken from many areas.

By its thickness, the skin graft can be classified as "split-thickness" and "full-thickness" (Fig. 8).

##### (1) Split-thickness skin graft

Split-thickness skin graft includes the epidermis and part of the dermis, and also some dermal skin appendages (sweat glands, hair follicles, and sebaceous glands). Its thickness varies from thin (Thiersch skin graft, 0.008 inch) to thick split-thickness skin graft, composed of three quarters of the dermis.

Percentage of "take" or survival of this graft is high, because the blood vessels have less tissue to grow into and nourish. But late shrinkage of the graft after grafting (secondary contraction) is more striking.

The split-thickness skin graft can be removed by free hand (razor blade or knife) or dermatomes (Padgett type dermatome or power driven type machines) (Fig. 9). Split-thickness skin graft is usually used in large areas of skin loss (burn, avulsion, tumor excision etc) and granulation tissue beds.

The donor site of split-thickness skin graft heals by spontaneous epithelialization from the wound edges and the skin appendages.

##### (2) Full-thickness skin graft

Full-thickness skin graft includes the epidermis and the whole layer of the dermis. It provides ideal coverage, but, because of its greater thickness and slower revascularization, it is less easily to take than a split-thickness skin graft. Once it has taken, shrinkage of the bed is minimal.



The full-thickness skin graft can only be removed by free hand using a scalpel. The fat underneath the skin is then removed with a pair of scissors.

Full-thickness skin graft is usually used in special areas such as eyelids, fingers, palms and soles or on the face for better color match.

The donor site is a full thickness skin loss wound so it cannot heal spontaneously. It should be closed primarily or with a split thickness skin graft.

### (3) Survival or "take" of skin graft

After a skin graft is placed on the recipient bed, during the first few hours its viability is maintained by receiving nutrition from fluid in the recipient bed.

This process is through plasmatic or tissue perfusion. Subsequently blood vessels from the bed begin to grow gradually into the graft to provide new circulation. Only by 5 to 7 days, depending on the thickness of the graft, revascularization of the skin graft is completed. Then it is referred to as a "take". Therefore, it is of paramount importance that a recipient bed should be well vascularized. Poorly vascularized beds such as bare tendons, cortical bone without periosteum, heavily irradiated areas, infected wounds etc are not suitable for a skin graft.

To guarantee "take" or a high percentage of "take", the skin graft must be immobilized postoperatively to prevent movement of the graft on the bed and/or hematoma formation. Both of which would separate the graft from its bed and prevent ingrowth of new vessels. Therefore, good contact of the skin graft can be achieved by applying thick dressings with appropriate pressure.

Infection, undue pressure, too high a room temperature, dependency of the operated part (which causes venous stasis) are all unfavorable factors for a skin graft take.

## 2. Skin Flap (Pedicule Skin Flap)

A skin flap (Fig. 10a + b) is a block of tissue composed of skin and its subcutaneous layers, which is moved from its donor bed to another site, keeping its vascular pedicle intact for nourishment all the time. The term "pedicle" is often used synonymously with the term "flap", but the pedicle refers to the stem, or base of the flap.

A skin flap can be named by the type of pedicle that it possesses [bipedicle, transpositional (Fig. 11), rotational (Fig. 12), or tubed pedicle (Fig. 13), or by its location (forehead, neck, abdomen, thigh, arm etc.)].

A random flap denotes a flap designed without a specific blood supply, and an axial flap (Fig. 14) is the one based on a known artery.

Flap design must take into consideration the anatomy of arteries and veins. If the flap is badly designed, because of poor venous drainage or poor arterial supply, it may not survive. So one must be especially careful in using flaps below the knee, across the midline, in areas of scar, in irradiated area, because they