General Principles

4

Principles Are the Bedrock of Plastic Surgery and a Starting Point for Constructing Sensible and Logical Answers

Koru

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The Koru is a spiral shape, based on the shape of a new unfurling silver fern frond. In Maori culture it symbolises new life or beginnings, growth, strength regeneration and peace.

In plastic surgery, perfection is only just good enough.
(Sir William M. Manchester, 1960s)

4.1 Looking Back

The specialty of Plastic Surgery has a long and rich history dating back to the ancient Sanskrit text, Susruta Samhita in the sixth century BCE. Throughout surgical history, the giants of our specialty were keen observers and had a great ability to succinctly record general principles. Regardless of the problem, whether it be congenital or acquired, the plastic surgeon's task is to restore form, function and appearance. This can only be achieved by adapting one's knowledge of anatomy, physiology and wound healing to address reconstructive and aesthetic challenges. The use of general principles makes it possible for the plastic surgeon to devise creative solutions to an ever-increasing variety and complexity of problems that modern civilisation produces. Time will pass and generations of plastic surgeons will come and go, but the principles of plastic surgery will stand the test of time.

4.2 What Are Principles?

Principles are the fundamental underlying truths and beliefs that form the foundation of our knowledge and values and guide our actions. Everything can be reduced to a set of principles, rules or guidelines. In the surgical context, a principle is a basic guideline or common sense rule that we use intuitively in everyday practice to treat our patients. When we list the published general principles of Plastic Surgery, one cannot be surprised at how similar these are between authors.

Dr. Robert Chase (a leading plastic surgeon at Stanford University, California) noted that: A principle develops through a period of gestation, it is not born fully developed. Once born, a principle continues to evolve and to become more refined as new developments prompt expansion or modification of the principle. In rare instances, dramatic medical advances prompt expansion or modification of the principle. Unlike a technique, which ought to be replaced or refined regularly as new methods develop, the core of a principle is likely to survive [1] (Fig. 4.1).

We believe that by embracing basic reconstructive principles, the Plastic surgeon is equipped to be creative and innovative in seeking surgical solutions to complex problems. This enables us to create modifications to standard procedures to fit the surgical problem (and not make the problem fit a standard procedure).

In this chapter we will discuss General Principles which can be used for all aspects of Plastic and Reconstructive Surgery.

Fig. 4.1 Dr. Robert Chase of Stanford University, California

Some of these basic principles have changed very little since their enunciation centuries ago.

Let us start in the sixteenth century.

4.2.1 Ambrose Paré (French Barber Surgeon 1510–1590) (Fig. 4.2)

In 1564 Paré, by then with considerable surgical experience, quoted Celsus (75 BC to 50 AD)

> 'Wherefore you should cut off as little of that which is sound as you possibly can, yet so that you cut away that which is quicker, than leave behind anything that is perished.'

Fig. 4.2 Surgeon Ambrose Paré

1. To take away what is superfluous. *To eliminate that which serves no purpose*.
2. To restore to their places things which are displaced. *This required recognition of normal parts and diagnosis of the abnormal position.*
3. To separate tissues which are joined together. *Separation of congenital syndactyly or acquired fusion due to burns.*
4. To join those tissues which are separate. *These required the ability to conceptualise the norm.*
5. To supply the defects of Nature. *Requires the ability to visualise restoration to a normal state.*

4.2.2 Gaspare Tagliocozzi (Italian Surgeon from Bologna 1545–1599) (Fig. 4.3)

In 1597 towards the end of his short life Tagliacozzi from Bologna, Italy recorded:

> We restore, repair and make whole those parts…..
> Which nature has given but which fortune has taken away,
> Not so much that they may delight the eye
> But that they may buoy up the spirit and
> Help the mind of the afflicted [2].

4.2.3 William Stewart Halsted (Johns Hopkins Hospital Founding Surgeon 1852–1922) (Fig. 4.4)

William Halsted promoted seven principles of wound care, known as the *Tenets of Halstead* in the 1890s. Whilst these were written for all surgeons, they are still very applicable to Plastic and Reconstructive Surgery this century.

Fig. 4.3 The Italian Renaissance surgeon Gaspare Tagliacozzi

1. *Handle tissues gently*
2. *Achieve meticulous haemostasis*
3. *Preserve vascularity*
4. *Ensure strict asepsis*
5. *Ensure good approximation of tissues*
6. *Close the wound without tension*
7. *Avoid dead space*

4.2.4 Captain and Later Sir Harold D. Gillies (1892–1960) (Fig. 4.5)

Gillies, with his huge experience treating facial injuries inflicted during World War 1 developed a set of Principles about 1920 [3].

Pre-operative

1. *Mistakes in diagnosis due to inadequate examination are perhaps the commonest cause of indifferent treatment.*
2. *In planning the restoration, function is the first consideration … and the best cosmetic results are, as a rule, only to be obtained where function has been restored.*

Fig. 4.4 Professor William Halsted of Baltimore

Fig. 4.5 Sir Harold Gillies the military and the civilian plastic surgeon

3. *The restoration is designed from within outwards. The lining membrane must be considered first, then the supporting structures, and finally the skin covering.*
4. *There is no royal road to the fashioning of the facial scaffold by artificial means: the surgeon must tread the hard and narrow way of pure surgery.*
5. *It may be laid down as a guiding maxim that the replacement should be as nearly as possible in terms of the tissues lost,* i.e. *bone for bone, cartilage for cartilage, fat for fat,* etc.

Intra-operative

1. *All normal tissue should be replaced as early as possible, and maintained in its normal position.*
2. *Speaking generally, the use of any foreign body is to be condemned whenever it is possible to substitute a graft from the patient himself. Any form of foreign body is a tissue irritant, and tends to give trouble early or late, in the attempt on the part of the tissues to remove it, whereas grafts, if successful in the early stages, continue satisfactorily.*
3. *The gain of skin below the mouth has to be written off against the loss, which occurs when the bed from which it was raised is closed.*
4. *Apart from those containing a definite artery such as the superficial temporal (the base of which may be cut quite narrow), the base should be at least as wide as any other part of the flap.*
5. *The pedicle is returned not earlier than 10 days in most cases, and it is of advantage largely to increase this interval where the blood supply of the receiving bed is dubious.*

Postoperative

1. *Disappointment is in store for him who would confine his repair to the surface tissues, heedless of Nature's lessons in architecture.*
2. *Satisfactory early results are obtained by very cautious and repeated injections of paraffin wax in small quantities, but the late results are rarely good and are often appalling this principle would be condemned in modern concepts.*
3. *For larger hollows, free fat and muscle grafts are used: these are naturally more uncertain of result … it is not yet established how they will be affected in conditions of wasting and in old age. The fat-graft however, owing to fat necrosis, often undergoes a partial absorption.*
4. *The production of an invisible scar is a question constantly exercising the mind of the plastic surgeon.*
5. *The factors necessary for the production of the optimum scar are: asepsis, avoidance of tension on the apposing sutures, perfect apposition of the skin edges, an often unknown personal factor in the patient, early removal of sutures.*

6. *The most frequent cause of failure of a Wolfe graft is lack of pressure firm enough to ensure complete apposition.*
7. *Time is the plastic surgeon's greatest ally, and at the same time his most trenchant critic.*

Gillies' 1920 principles were rewritten later to embrace his change from military to civilian plastic surgery, reduced in number and were known as *The Ten Commandments of Gillies.*

Gillies' ten commandments of plastic surgery

1. *Thou shalt make a plan.*
2. *Thou shalt have a style.*
3. *Honor that which is normal and return it to normal position.*
4. *Thou shalt not throw away a living thing.*
5. *Thou shalt not bear false witness against thy defect.*
6. *Thou shalt treat thy primary defect before worrying about the secondary one.*
7. *Thou shalt provide thyself with a lifeboat.*
8. *Thou shalt not do today what thou canst put off until tomorrow.*
9. *Thou shalt not have a routine*
10. *Thou shalt not covet thy neighbour's plastic unit, handmaidens, forehead flaps, Thiersch grafts, cartilage nor anything that is thy neighbour's*

These ten commandments were later increased to 16 Principles, by Gillies and Millard [4] (Fig. 4.6). In their chapter on Principles they stated that 'The father and mother of all principles in reconstructive surgery is that *plastic surgery is a constant battle between blood supply and beauty*'.

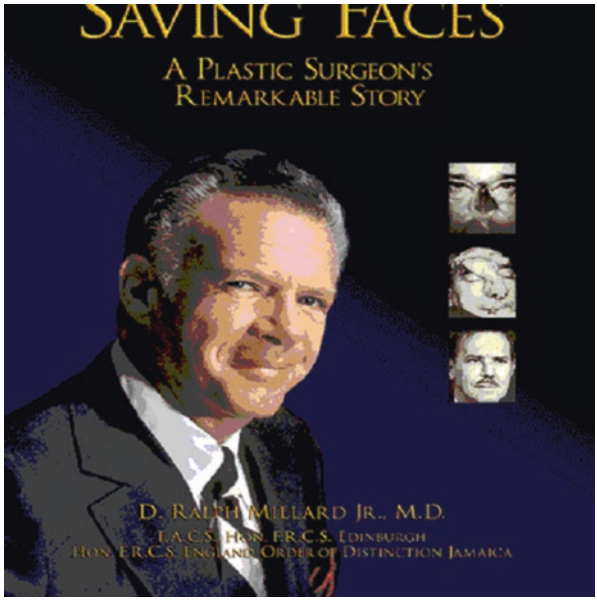

Fig. 4.6 Dr. D. Ralph Millard Jnr

1. *Observation is the basis of surgical diagnosis*
2. *Diagnose before you Treat*
3. *Make a plan and a pattern for this Plan.*
4. *Make a Record*
5. *The Lifeboat*
6. *A good style will get you through*
7. *Replace what is normal in normal position and retain it there*
8. *Treat the primary defect first*
9. *Losses must be replaced in kind*
10. *Do something positive*
11. *Never throw anything away*
12. *Never let routine methods become your master*
13. *Consult other specialists*
14. *Speed in surgery consists of not doing the same thing twice*
15. *The aftercare is as important as planning*
16. *Never do today what can honourably be put off till tomorrow.*

Dr. D. Ralph Millard (formerly a journalist before studying medicine) later expanded on these principles and classified them in to:

1. *Preparational* Principles
2. *Executional* Principles
3. *Innovational* Principles
4. *Contributional* Principles
5. *Inspirational* Principles

He promoted *The Plastic Surgeon's Creed* condensing the 33 principles to:

> *Know the ideal beautiful normal*
> Diagnose what is *present*, what is *diseased, destroyed, displaced, or distorted*, and what is in *excess*.
> Then, guided by the normal in your mind's eye, utilise what you have to make what you *want*—and when possible *go for even better* than what would have been.

See Appendix B.

4.2.5 Sir William Manchester

(Trained in Plastic and Reconstructive surgery during World War 2 by Gillies, McIndoe and Mowlem) (Fig. 4.7).

Manchester had a huge influence on the Authors and constantly repeated his principles with almost religious fervour.

The Mantras of Manchester

- When faced with a plastic surgical Problem.
  - *Make an accurate diagnosis, taking in to account the patient's history.*

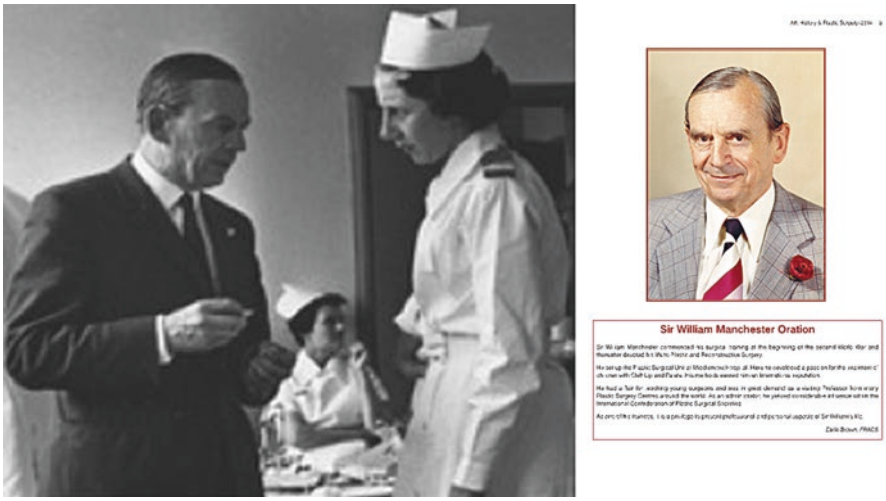

Fig. 4.7 Sir William M. Manchester and Sister 'Eddie' Edwards

- Is there any tissue missing or is it merely displaced?
- How much and of what tissue is missing or displaced?
  - *How much skin is missing?*
  - *How much subcutaneous tissue is missing?*
  - *How much muscle is missing?* etc.
- Review the methods available for reconstruction
  - *Can you repair it with local tissue?*
  - *Can you repair it with a free graft?*
  - *Can you repair it with a distant flap?*
  - *Can you repair it with a free flap?*
  - *A combination of any or all of the above.*

The result should be judged by the patient, and peers in the long-term follow-up clinic, that is, in "The Hall of Truth".

Always remember, "Perfection is only just good enough".

The authors have embraced the *16 Principles of Gillies and Millard* and the *Mantras of Manchester* in their practice over many years. In addition to these Principles we strongly recommend a further Principle, *Restoration of Function.*

4.2.6 How Does the Student of Plastic Surgery Use Principles in Surgical Practice?

During their training in Plastic and Reconstructive surgery, the trainee will be strongly influenced by the Principles espoused by their teachers and mentors [5–10].

Whilst each Principle is reduced to one line of text we believe that the trainee should have thought beyond these words to obtain the wider implications of that

Principle. In doing this, the Principle is enhanced and this will influence judgement and decision making and will lead to innovation in solving reconstructive problems. Sometimes the stated General Principles overlap with Specific Principles relating to Disciplines within Plastic Surgery. Robert Chase's Principle of using salvageable parts in severe hand injuries is a specific use of a Principle, compared with the general principle of Gillies and Millard, No. 9: *Losses must be replaced in kind.*

Let us take *Diagnosis of a skin tumour* as an example to study a Principle. This introduces your contact with the patient. Not only should you establish empathy with the patient, but *listen* to his or her concerns.

> Throughout the surgical period and long after it, the patient will lean heavily on the surgeon for mental support, for hope and encouragement ….
>
> *(Sir Archibald McIndoe 1958)*

During this initial patient contact you should be using your powers of *observation* where you can obtain much information about the patient and their problem. In general, does the patient look healthy? Note the site of the problem and mentally recall the local anatomy. This leads to the physical examination; looking at the tumour and its characteristics, the condition of the surrounding skin and noting various characteristics such as solar damage, laxity, relaxed skin tension lines and suitability for a local flap repair. Check out other areas which may be relevant to the diagnosis such as regional lymph nodes (this is also an opportunity to do a general skin check for other tumours and conditions). Additional tests such as tissue biopsy and radiology may be required to establish a diagnosis.

The diagnosis may or may not be immediately obvious. We recommend you look at the wider implications of your history and examination to make sure that nothing is missed.

If you cannot come up with a diagnosis consider the surgical sieve of medical school days.

Congenital, traumatic, neoplastic, inflammatory, etc.

Once you have made a diagnosis, consider the treatment. If it is a tumour, assess the consequences of its adequate excision.

How much tissue is missing? This is an opportunity to review the anatomy of the region and what and how much of each tissue has been excised.

The treatment plan involves a review of the methods of reconstruction of each missing tissue, repairing with like tissues.

- Primary closure
- Local flaps
- Free grafts
- Microvascular tissue transfer
- Pedicled flap transfer
- A combination of methods

When you have a plan, consider alternate treatment methods (a lifeboat) should the situation change during surgery.

Once the surgery is completed, consider post-operative management, including dressings and monitoring for flap vascularity.

A thoughtful appraisal of all the plastic surgery principles should give the exam candidate the tools to influence their judgement and decision making. Plastic surgery principles are the elementary truths which provide the framework for sound clinical and surgical practice. They are the quintessential structure of plastic surgery and the fabric of our plastic surgery tapestry. With them we can become good human tailors! Perhaps the most important principle for plastic surgeons is the eloquent dream of the late master plastic surgeon Dr. Madeleine Lejour [11] of Belgium, who in December 2007 wrote:

> I have a dream. I would like to see reconstructive and cosmetic surgery practiced only by well-trained surgeons, with high ethical standards, concerned with the service to their patients more than with money and self-promotion. If we could reach the high standards of my dream, there is no doubt that plastic surgery would progress much faster, and fewer patients would suffer from trial and error. I have that dream, and it will be my last professional contribution.

References

1. Chase RA. Belaboring a principle. Ann Plast Surg. 1983;11(3):255–60.
2. Burget GC, Menick FJ. Aesthetic reconstruction of the nose. St. Louis: Mosby; 1994.
3. Gillies HD. Plastic surgery of the face. London: Henry Froude, Hodder and Stoughton; 1920.
4. Gillies HD, Millard DR Jr. The principles and art of plastic surgery. Boston: Little, Brown; 1957.
5. Rana RE, Puri VA, Baliarsing AS. Principles of plastic surgery revisited. Indian J Plast Surg. 2004;37(2):124.
6. Millard DR. Principlization of plastic surgery. Boston: Little, Brown and Company; 1986.
7. Freshwater MF. A critical comparison of Davis' principles of plastic surgery with Gillies' plastic surgery of the face. J Plast Reconstr Aesthet Surg. 2011;64:17–26.
8. Pettit JA. Underlying principles of plastic surgery. Calif State J Med. 1922;20(11):398.
9. DeMichele T. The importance of principles-fact/myth. Posted February 7, 2017.
10. Mulliken JB, Martinez-Perez D. The principle of rotation advancement for repair of unilateral complete cleft lip and nasal deformity: technical variations and analysis of results. Plast Reconstr Surg. 1999;104:1247–60.
11. Lejour M. Looking back at 50 years of plastic surgery. Plast Reconstr Surg. 2007;120(7):2106–9. https://doi.org/10.1097/01.prs.0000287388.25651.65.