WHITHER PLASTIC SURGERY? TRENDS FOR THE FUTURE [1, 2]

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THE art of foretelling the future may belong to astrology and the crystal ball, and such methods when used by surgeons can make them look foolish. Thus Lord Moynihan thought that surgery had reached its acme at the turn of this century, while Sir Ernest Finch put the date a little later. Neither could imagine the rapid advances to be made in cardiac surgery or in kidney transplantation, even though the preparations for such advances were being examined in experimental laboratories at that time.

Science has a different approach to the future. As Bronowski (1951) wrote: "The purpose of science is to describe the world in an orderly scheme or language which will help us to look ahead. We want to forecast what we can of the future behaviour of the world; particularly we want to forecast how it would behave under several alternative actions of our own, between which we are trying to choose." The contribution of science is the recognition that every prediction carries with it its own measurable uncertainty. Bronowski continued: "A good prediction is one which defines its area of uncertainty: a bad prediction ignores it".

It is right that we should try to plan for the future, but how can it be done? "In many scientific problems, the difficulty is to state the question rightly: once that is done it may almost answer itself" (Bronowski). In this respect the question is whether the scope of plastic surgery should be defined, the quality of the plastic surgeon improved, or both? My thesis is that the surgeon defines the work and that future development of the specialty will depend on the stature of its surgeons.

At the present time of change, uncertainty and experiment there is a reasonable chance that imaginative planning will influence future development in plastic surgery. It is pertinent that the recent report of the Royal Commission on Medical Education emphasises that such education should continue throughout professional life, and not cease for anyone on attaining consultant status.

Historical Review of the Development of Plastic Surgery in Great Britain.—Prediction without retrospection is unlikely to succeed, so that a brief review of past events is pertinent. When Gillies and Kilner set up a unit for plastic surgery at Sidcup Hospital in 1918, the objective was to repair defects due to the First World War. The techniques developed were essentially for the transfer of skin and the restoration of contour: when the supply of patients was exhausted, so was the value of the surgical team. Examination of other aspects of reconstruction, in congenital deformities for instance, served to preserve the concept of a special and necessary service, but it was only at the time of the Second World War that interest was revived. The surgical offering was the same and it was not until plastic surgeons could offer more than techniques—which easily could be acquired and used by other specialties—that they were taken seriously as representing a separate surgical discipline.

This has now happened, but the credit for it does not belong entirely to the surgeons concerned. The institution of the National Health Service in 1948, the growing public interest in personal appearance, the awareness by the profession as a whole that certain deformities (especially those of cleft lip and palate) were better treated by plastic

[1] 1968 Kay-Kilner Essay Prize.

[2] Mr Calnan's views and opinions are not necessarily those of the Council of the British Association of Plastic Surgeons.

surgeons, and the discovery of the vast amount of ill-health in the population in numbers too great for the present hospital resources (as waiting-lists in all regions show) have all played a part.

Basic Principles of Growth.—In reading the history of the development of medicine it is possible to discern certain principles for the growth of a specialty. There are six which apply to plastic surgery :

1. *Demand.*—The demand by the public for plastic surgery and the interest of pupils who wish to practise it will ensure that the specialty remains recognised and viable.

2. *Adaptability.*—The specialty which can show that its techniques or methods can be applied to a variety of conditions will not only survive but extend. Thus, the anæsthetist with his special knowledge and skills today treats patients with tetanus, respiratory poliomyelitis and poisoning. If at some future date the specialty of clinical physiologist was to be established it would not be surprising if the latter superseded the anæsthetist's role in these conditions—but only when it could be clearly shown to be to the benefit of the patient.

3. *Basic Information.*—The specialty which investigates its own procedures understands them better and to some extent makes them more difficult for others to comprehend. New controls and parameters for success are discovered which not only reduce current morbidity and mortality but make possible further advances for the benefit of all. Moreover, this tends to breed the receptive mind so that the value of advances in other disciplines—whether in medicine, engineering, chemistry or physics—is recognised and they are adapted and incorporated into clinical practice. Research is important for these and other reasons which are discussed later.

4. *Teaching.*—Undoubtedly the best way to encourage trainees to any specialty is to include, in the general undergraduate programme, lectures on the subject. If these are intellectually stimulating and with clear logic, then the increased demand by the best students for training in this specialty is noticeable. Teaching then is vital for growth.

Among the many experimental methods of undergraduate teaching, the integrated course proposed by the new University of Newcastle upon Tyne is outstanding, because the anatomy, physiology, medical and surgical treatment of any one disease is taught as a single integrated subject. The part that can be played by plastic surgery in such a programme should be obvious : it can also have an important part to play in general professional training in surgery (Royal Commission, Appendix 5).

5. *Close Integration with other Branches of Surgery.*—Whenever specialties have been isolated from the general body of medicine, progress in the treatment of disease has not advanced as quickly as expected. This is not to say that specialist hospitals have no place in present-day practice, but their value is limited. For example, the isolation of tuberculosis and mental health from general hospitals has done little to improve the prospects for treatment. To these one could justifiably add general practice, orthopædics and plastic surgery.

6. *Clinical Responsibility.*—A recent editorial in the *British Medical Journal* (1968) entitled " Radiology in the Doldrums " comments on the reports from the Royal College of Physicians, the U.S. National Advisory Committee on Radiation, and from New Zealand. It recommended " increasing the number of academic posts, the opportunities for postgraduate study, and the facilities for research must surely be accepted as a necessity if radiology is to thrive as a specialty. The present dearth of candidates may be due as much to unattractive features of the career as to a shortage of training posts."

Surprising as this may be, the serious shortage of radiologists is world-wide, and so

to the list above we must add a sixth principle for growth—clinical responsibility—the lack of which is at least partly responsible for keeping radiology an unattractive specialty.

What do we mean by training ?

Vocational Training.—At a Meeting of the Royal Society of Medicine in 1966 Welbourn pointed out that " training " and " continuing education " are different functions, but both are necessary in surgery. " Training is vocational and concerned with bringing a man to a desired standard of efficiency by instruction and practice. Education is academic and has to do with the intellectual and critical faculties. Training and education are complementary to each other and must proceed together." They are here considered separately.

The object of training in plastic surgery should be to bring a man to the stage of technical ability. Technical excellence comes with practice—practice as a consultant and not as a junior—and should not be an object in training. For this, I consider a period of two years to be ample, provided that the work done during this time is planned and graded.

In the general course of events, demonstration of a surgical technique (in which the trainee should be scrubbed up and not watching from afar) at the first stage, should be followed by the role of assistant at the next, the consultant acting as assistant at the third, and the trainee doing the operation alone at the fourth. All patients treated by the trainee should be seen at the clinics of the consultant, who is thus able to judge progress and results under his direct supervision.

The graduation of procedures is not difficult. A trainee might proceed from simple suturing to more complex methods of suture, to split skin grafts, skin flaps, and then to the surgical treatment of special conditions. It would seem to me that a trainee who has cut and applied say 20 skin grafts will gain very little by increasing this number. By the same token a trainee who continues to have failures at his twentieth graft should be examined for his suitability, either of temperament or manual dexterity, for this specialty. I am making a basic assumption throughout the whole of this paper that we all want the best people possible for surgery, in surgery. This does not mean that we want only those of the highest possible intellectual calibre (we want as many of those as we can get), but we also want people of character and humanity who will always feel a pride in belonging to our specialty. Since technical ability plays such a large part in plastic surgery, a supervisor must be prepared to form judgments on the trainee's suitability at an early stage in his career.

Welbourn also considered that two principles are fundamental to adequate clinical training : one is that personal responsibility for patients should be progressive, and the other that the variety of clinical experience should be wide. With a large list of patients waiting for admission (as there are at nearly every plastic surgery unit in the country), both of these can be planned, and not left to chance. The proposed new draft regulations submitted by the Special Advisory Committee for Plastic Surgery should go a long way to meeting this objective.

Thus by the end of the first year of vocational training, a capable trainee should be provided with :

1. A weekly out-patient clinic for new and old patients.
2. A weekly operating session for waiting list patients.
3. The chance to treat most emergencies.
4. The opportunity to give lectures to nurses and students and a helping hand to his successor.

At the end of two years, a trainee might spend one year in laboratory research. Such

a sequence is attractive, and ideally the period of vocational and academic training should run concurrently, two whole days each week being spent in the surgical laboratory, and the remainder in clinical practice (and this of course does not preclude clinical research at this time).

It was Lord Moynihan who said that every patient posed two questions : " What can I do for this patient ? " and " What can this patient do for me ? "

The answer to the first question comes from vocational training, and the second from academic education.

Academic Education.—As Welbourn has stated, in vocational training we assimilate what is known already and learn to practise it ourselves,[8] but in academic education we aim to improve standards and advance surgical practice by attention to the scientific basis of surgery, and this is a life-time of continuing education. " We learn that knowledge is based, not on the authority of our teachers and books, but on observation and reasoning. We also discover that observation can be checked at first hand, and reasoning can be challenged."

Welbourn also points out that academic education is absolutely essential if any branch of surgery is to advance and if the care of patients is to improve, and this can only be provided in an environment where research is in active progress, where work in the laboratories and work in the wards go hand in hand, and where advances in other fields—general medicine, chemistry, engineering and so on—are constantly being applied to other problems. " Every surgeon should, at some time, be exposed to this kind of environment so that he can assimilate its exciting atmosphere and at least discover what it is all about ; if he can play a minor part in the discovery of new knowledge by, for instance, making some of the observations in a controlled clinical trial, so much the better."

Research is essential for our specialty so that students who might consider application for training shall see plastic surgery as a continually advancing subject. To ensure such advances we have to learn to use a special kind of observation, called experiment, and make use of measurement and calculation. As Harvey said, the object is to " search and study out the secrets of nature by way of experiment ".

Barrat-Boyes, complaining about the teaching of surgery in New Zealand, stated that the basis of surgery is function not structure, and the surgeon needed to be trained to apply his knowledge.

Personal research should teach a trainee five things :

1. How to think.
2. How to read journals critically.
3. How to construct ideas.
4. How to advance a hypothesis and support it.
5. How to criticise one's own work objectively.

Experimental research is not for the inept or incurious. It is commonly thought that research is easy, that a man who is unable to qualify clinically in the specialty should go in for research. This is the reverse of the truth. It is becoming increasingly clear that those institutions which practise surgery of the highest order are the very places where research also is of the highest order, and from which the great advances at the frontiers of surgery are coming.

As Bronowski observed, " Science is the acceptance of what works and the rejection of what does not ".

Clinical practice tends to breed conservatism and stability, to the immediate advantage of patients. But what advantage accrues in 10 years' time ? Clinicians have

few means of finding new methods or of assessing them critically. They may have become more expert in technique, but at the price of being outdated. This is not to say that all that is new is best, but rather to state that some at least of what is old (but currently taught) is bad and could be improved. It is a standing temptation of mankind to put routine, which calls for no thought and little effort, in the place of judgment, which calls for both.

Research prevents parochialism which clinical practice, in a specialist society, fosters. We should wish our trainees to have the ability to think of problems in other specialties and the ability to appreciate how advances in our own specialty may help to solve them. This is the basis of interdependence in surgery. The scientific method is a continuum of observation—hypothesis—prediction—verification—and back again to new observations, and of these the most important is " observation ", because invention follows where knowledge leads the way.

Surgery sorely needs new horizons, new concepts and new intellectual freedom, for the challenge of the living world and its diseases has not yet been met. The great intellectual conquests still lie ahead.

Postgraduate Institute.—Unlike several other specialties, such as dermatology, otolaryngology and urology, there is no postgraduate institute in plastic surgery. While it is true that many of these grew up in London at a time when the specialty of plastic surgery was being formed, it is worth considering their importance at the present time. The Todd Commission (para. 451) rather condemns them out-of-hand with the recommendation that they are too small to be viable on their own and so should be embodied within a larger hospital. But the Commission seeks to rationalise hospital services on economic rather than academic principles, and this may not in the long run be the best method in the advancement for the relief of human suffering. In international affairs there may be a place for the establishment of a postgraduate institute and this should be kept in mind for future planning. It should, however, be established within the framework of a general hospital and not in isolation.

There are four additional skills to be learned in a scheme for continuing education because they are essential for communication with colleagues :

1. How to use a library.
2. How to write a paper.
3. How to deliver a paper.
4. How to assess published work.

1. *How to use a Library.*—The trainee should be taught where the chief sources of information lie and should also know of interlibrary loans. Since access to a library will be important for the rest of his life, all trainees should receive commensurate practical instruction in its use. It should follow naturally that the trainee, seeing an unusual condition for the first time, will wish to consult original papers on the subject. He should be so familiar with the layout of the library that his search does not become a major task in the day's work.

2. *How to write a Paper.*—Over the past two decades it has become accepted that scientific information should be recorded for journals in a standard manner. Although such restrictions may cramp the style of some authors, it does on the whole make for completeness and easier reading.

The introduction should set out to hold the reader's attention, and be followed by a description of the material under survey and the methods used in the investigation. The results of the work should then be stated so that fact is separate from opinion (which can be introduced under the heading of " discussion "). Practice in writing papers should be an essential part of training.

3. *How to deliver a Paper.*—Although one may prefer to write papers for the journal, eventually the surgeon is asked to deliver his work in person so that others may see and hear him, and so judge for themselves what manner of man he is, and discuss with him the work presented.

Training for this role can be done weekly by presentation of hospital case records at a staff meeting. One criterion of a good presentation is whether the trainee can make a primarily plastic surgery patient of interest to surgeons in other specialties. Many do this well and there follow two advantages: firstly, ideas from colleagues in other disciplines, unbiased towards reconstructive surgery, may materially help in diagnosis or management; secondly, it keeps the whole patient and his personality in the picture. For instance the patient may have had a graft for a skin cancer, but may also present general metabolic changes which are pertinent and of interest to a much wider audience.

Speaking at meetings is a quicker and easier way of reporting new work than writing articles for journals. Speaking is an art in itself—and there is a great difference in language and presentation between speaking and writing. The spoken communication must still have form—a beginning, middle and end—but this is not such a rigid structure as for writing. Many learned societies (and the House of Commons) insist that communications should be spoken and not read, for reading aloud by most of us is impersonal and dull. A clear, concise and well-delivered paper has almost certainly amply repaid its author—by consolidating his knowledge of his subject and by the acquisition of a skill which he will use over and over again.

Learning to speak well would raise the standard of performance of papers delivered at association meetings not only by precise and clear statements of fact or opinion but also by improving the quality of work needed to support them.

4. *How to assess Published Work.*—Sooner or later the trainee has to learn how to approach published work in his specialty in a mature and critical manner. Experience, personal knowledge of the authors, and previously personal work in the subject, all help to make up one's mind on newly published work. But if these are absent, what then? Like the accountant who when asked what he thought of a certain commercial company, replied: "Show me their balance sheet and I'll tell you all you want" so too in an empirical way an examination of the tables and graphs in surgical papers tell their own story.

The ability to assess published work will naturally improve with continuing education, and is something wihch cannot be taught directly. Senior consultants in training units, however, by arranging in an orderly manner the evidence supporting or refuting a particular publication, should demonstrate the intellectual process necessary in assessment.

What is "Trained"?—A. *General Professional Surgical Training.*—The Royal Commission on Medical Education commented: "The doctor of the future must be educated not so much for the future as we now see it but for a world in which everything —the content of medicine, the organisation of medical care, the doctor's relationships with his colleagues and the community, and indeed every feature of his professional life and work —is on the move. Only if our recommendations succeed in producing a system of medical education which can prepare a doctor for this kind of life will they have lasting value."

Among these recommendations, Appendix 5 setting out the general professional training to follow the interim year (after medical qualification) is important. The three-year course in general surgery would allow a man to spend one year in plastic surgery with one other subject during his first year, and also allow a six-month period of laboratory research during the second and third year. Thus a man already inclined towards our

specialty could begin to plan his training soon after qualification. By allowing the F.R.C.S. examination to be taken during these three years of general professional training, " the early postgraduate phase ceases to be dominated by preparation for formal examinations, and many more trainees than at present should be able to take part in research " (Royal Commission, para. 93). The Advisory Committee in Plastic Surgery has agreed with this recommendation.

The Royal Commission would go further and remove the necessity of obtaining the F.R.C.S. before admission to specialist training : " When a general assessment of the trainee's performance and potentiality indicates that he has satisfactorily completed his general professional training, he should be given a certificate to this effect : those who have done exceptionally well in examinations or have shown outstanding ability in other respects should get special credit, which should be noted in the certificate ".

Such imaginative training after graduation but before specialty training might remove the futility of those years of acquisition of new knowledge, which is quickly forgotten and of little application, now demanded for the primary and final F.R.C.S. examinations. The recommendations of the Royal Commission, if implemented, would also allow a younger and more active age-group to enter specialty training.

It is surprising how much of the negative there is in all of us, a kind of eagerness to say " No " to ideas and people. We find it in ourselves when asked to move out of the rut of routine.

As a specialty we are in a negative mood, too, not quite sure how to practise the positive either in teaching, research or international relationships. One possible way for future development is to encourage more integration of units. At my own hospital the plastic surgery unit is a unit within the Department of Surgery. It is intimately concerned with the surgery of rheumatoid arthritis, and has a combined clinic for out-patients ; with the selection of possible donors for renal homotransplantation and carries out all the cross skin grafts for the Urology Unit ; with the investigation of swollen limbs by special venography and lymphography for the Vascular Unit, and, by virtue of the fact that we do all lymphography, contact with radiotherapists treating large series of patients with Hodgkin's disease and cancer of the cervix are automatically maintained.

B. *Plastic Surgery Training*.—The assessment of satisfactory training in the specialty of plastic surgery is a more difficult matter, for we have no adequate criterion by which to assess clinical ability. It is submitted that three requisites are essential :

1. Evidence of technical ability. This can be assessed from the trainee's book of operations performed, but personal observation of a man in the operating theatre and out-patient clinic, where he is dealing directly with patients, is desirable. This could follow the pattern of the American Board's system, and in a small specialty should not be difficult or costly to arrange.

2. A list of publications, with reprints available for inspection, and a notebook of experimental observations could be accepted as evidence of learning in the subject and of academic training.

3. It would be an advantage to the trainee and to the specialty to submit a thesis at the end of the third year. The trainee might enter this for a higher surgical qualification, and at the same time he would be ploughing back into his specialty special knowledge, which might become a standard reference of a particular subject studied in depth. Sweden has shown how valuable such theses can be.

Summary of Recommendations for the Future

1. It is considered that plastic surgeons should be trained and obtain consultant posts at a much earlier age than at present so that their useful working life to the community may be at least 30 years.

2. The F.R.C.S. examination might well be relegated to the position of a qualifying examination for surgery, and be taken within three years of qualification.

3. A three-year period of graded training in general surgery is considered sufficient before specialisation.

4. A three-year period of staged training in plastic surgery, of which one-third of the time is spent in academic education and two-thirds in vocational training should be sufficient.

5. In the first year, a trainee would observe and assist in clinic and theatre, and by the end of that time have begun an apprenticeship in procedures graded to his ability.

In the second year, the trainee should have the responsibility of his own clinic and theatre, where he can diagnose and treat conditions of greater complexity, including emergencies.

6. The time spent in the laboratory should be orientated to demonstrate the methods of research and the scientific approach to problems in the specialty. It should teach him self-criticism, how to think, how to construct ideas and how to test them as a hypothesis. Ideally (5) and (6) should run concurrently. All trainees should be taught how to use a library, write a paper, deliver a short clinical communication, and acquire criteria by which to judge the work of others.

7. Trainees who are considered unsuitable for further training at any stage (but usually within the first year of vocational training) should be helped to change to another specialty.

8. Training centres should show that there is an adequate plan of training in operation, sufficient time for instruction, and adequate clinic and theatre facilities (and see Royal Commission Report, para. 80).

9. The Council of the British Association of Plastic Surgeons should have small standing sub-committees to consider and report from time to time on current topics which are likely to have an effect on the future development of the specialty. Many surgeons would welcome brief reports on the possible application of computers in arranging priorities in waiting lists, information on the type of research being pursued at various centres, a national survey of the demand for plastic surgery, information on visitors coming to the United Kingdom and some idea of the type of clinical work being done at various units in the country (for they are not all identical) to record only a few.

10. Plastic surgery units should also consider the part they could play in the working of large general hospitals, and should not be averse to combining with other units to form, for example, a major surgical unit in the hospital for the surgical treatment of cancer with reconstruction. The plastic surgery unit might lose its identity to some extent, but the importance of the man is likely to be enhanced by such integration.

Finally, it is quite clear that without ideas, imagination, incentive and the wish for improvement, no changes of this nature will occur in plastic surgery in the next decade. The present units will enlarge but the pattern will remain the same, with all the disadvantages now recognised. Society is not static, nor should be our surgery.

It is evident from the text that I have quoted extensively from the published writings of Professor R. B. Welbourn: what is less obvious is the debt I owe to him for helping me to construct and clarify, in several conversations, those ideas on education in surgery which we share. It is a pleasure to acknowledge this help from a friend and a colleague.

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