During the past 15 years, surgery in Italy has undergone significant developments in health care services at the teaching and organizational levels. In 1987, the new teaching regulations of medical and surgical schools came into force with the introduction of integrated courses that converge into educational and training areas with precise objectives. For more than a decade, postgraduate schools have had a common guideline throughout the European community—becoming real “residencies.” Surgical activity is provided by university hospital facilities and hospitals with a business administration that is completely autonomous as far as organization, income, management, technique, and accounts are concerned. Research guidelines for future developments are mainly addressed toward optimization of organization and use of the most recent technology. The widespread application of day surgery and video-assisted surgery substantiates this evolution of surgery in Italy.

HISTORICAL BACKGROUND

The evolution of modern surgical erudition began in Italy during the 16th century, as in most western European countries, during the Renaissance, a period in which Italy experienced a deep evolution in the arts, sciences, and literature. During this period, Italian surgeons, unlike many of their foreign colleagues, often received a university education and held important academic positions. In these years, the first books were published, such as that written by the surgeon of Pope Julius II, De Vico, *Practica in Arte Chirurgica Copiosa Continens Novem Libros* (1514), concerning the treatment of gunshot wounds. This work represents the most detailed portrait of the European surgical outline at the end of the 15th century; the treatise was, therefore, translated into 7 languages and published in 40 publications.

During the same period, in Padua, a professor of anatomy from Acquapendente, Geronimo Fabrici, built at his own expense the first anatomy theater ever known. Fabrici carried out many anatomical and physiological observations, and he was an important physician and teacher of surgery as well. He was the first to highlight the importance of maintaining hemostasis during surgical procedures, he improved the technique of tracheotomy, and he suggested the use of animal sutures in the treatment of bowel lesions. Most of his theories were gathered in 1617 in the *Opera Chirurgica*, which contains all the studies he conducted as well as descriptions of the most common surgical procedures.

During the same years, Giovanni Andrea della Croce and Gaspare Tagliacozzi, who is considered the father of plastic surgery, conducted their surgical activity. As a matter of fact, during the 16th century there was a great need for reconstructive and plastic surgery procedures in Italy because of trophic lesions caused by syphilis.

In the 17th century, the cultural background of the country underwent an involution; hence, only a few surgeons were of the same reputation as their colleagues in the previous century. However, Cesare Magati, from Bologna, and Pietro De Marchetti, the author of the most famous
book of surgery of those years, Observationum Medico-Chirurgicarum Rariorum Silloge, represent the most outstanding surgeons of the century. Cesare Magati deeply influenced Italian surgery in several ways. His single work, De Rara Medicatione Vulcanam, Seu de Vulneribus Raro Tractandis, Libro Duo (1616), had great success, and Magati’s doctrine significantly affected the next century.

During the 18th century, education and the practice of surgery were relatively disorganized, as was the case throughout Europe, which became a wide theater of fighting caused by the Spanish Wars of Succession, which contributed to the barbarization of the culture of that time. In the last few years of the century a new attitude toward science and culture arose: “Illuminismo” (Enlightenment).

Therefore, only a few surgeons could acquire a reputation at a national level. Among these surgeons emerged Antonio Valsalva, professor of surgery in Bologna and surgeon of Ospedale degli Incurabili. In his main work he described and illustrated the smallest muscles and nerves of the ear, dividing the ear into 3 parts: external, middle, and internal. Valsalva’s name is linked to the maneuver characterized by forced expiration while keeping the mouth and nose closed.

In the 19th century, the historical events that brought about the unification of Italy did not allow valid evolution of the surgical doctrine; however, the figures of Antonio Scarpa, at the beginning of the century, and Edoardo Bassini, at the end of the century, emerged.

Antonio Scarpa held the chair of anatomy and surgery at the University of Modena until 1783, then he moved to the University of Pavia. Many works were published during all these years that made him famous also at a European level. Edoardo Bassini, who held the chair of surgery in Padua, remains well known for his technique for the treatment of inguinal and femoral hernia.

The 100 years of surgery of the 20th century exactly correspond to the 100 years of modern surgery. At the beginning of the 20th century, operating rooms began to look like those we know today, whereas in the past they were just teaching theaters. It is in these years that the first schools of modern surgery arose in Italy.

TEACHING IN MEDICAL SCHOOLS

The teaching regulations of the course of studies to graduate in medicine and surgery (the disciplined 6-year course included 27 examinations and a final thesis) in Italy envisaged, until 1986, as for general surgery, the teaching of the subject through 2 basic disciplines: the first is substantially dedicated to the study of the single diseases (third and fourth years) and the second is dedicated to clinical surgery, mainly differential diagnosis and therapy (fifth and sixth years).²

All the other surgical teachings, which significantly increased over the years, were represented by subsidiary subjects concerning the study of a single apparatus, for instance, vascular and thoracic surgery, pediatric and geriatric surgery, and the study of some basic aspects of surgery, such as physiopathology.

In 1987, in Italy, the new teaching regulations of medical and surgical schools came into force and forecast a deep innovation in teaching with the abolition of subsidiary subjects and the assembling of all disciplines, which are considered necessary, into integrated courses that, in turn, converge into educational and training areas with precise didactic objectives.

At present, the schools throughout the national territory account for 39 areas, and the assumption of the new regulations is to obtain an educationally modern instrument in compliance with the recent Italian university legislation and the European teaching guidelines of the Advisory Committee on Medical Training.

The key points of this reform are as follows:

- A common and coordinated program that abandons the fragmentariness of knowledge previously given in favor of the creation of “integrated courses” that allow the student to acquire basic knowledge for his or her future professional maturity, trying to avoid repetitions as much as possible. There are 32 integrated courses with 32 compulsory examinations, 8 subsidiary oral examinations, and a compulsory qualifying examination in scientific English. Special attention will be given to the teaching of general surgery, including it, along with internal medicine, in different educational and training areas, specifying every discipline related to the integrated courses.
- Institution of didactic scores valid at a national and European level allowing the student to move among different schools of medicine. Educational activities are divided into compulsory and subsidiary activities. Compulsory activities, in turn, are divided into formal and interactive modalities.
- Introduction, within the program of medical schools in Italy, of the concept of independent and guided study, ie, hours of activities taking place both independently and under the guidance and scientific assistance of integrated course teachers. Therefore, in Italy, too, the role of the tutor, which already exists in other countries, has been introduced.
- Access to the university level based on a programmed number depending on the facility and the teachers of every university. If the number of applications exceeds the expected number, an entrance examination is given. The course lasts 6 years and is divided into 12 semesters. Attendance at integrated courses is compulsory; during the undergraduate course the student must participate in 150 hours of training in experimental research laboratories or hospital departments. The training will be performed one semester before the end of the sixth year of the course under the responsibility of one of the teachers in the concerned area.

After the student graduates and before undergoing the qualifying examination (for practice), he or she is required to perform a 6-month rotating internship program as follows: 2 months in general medicine, 1 month in general surgery, 1 month between obstetrics and gynecology and pediatrics, 1 month in the emergency department, and, finally, 1 month in the laboratory. During the undergraduate course, the teaching of surgery is basically theoretical, leaving practical and training aspects exclusively to postgraduate schools.
POSTGRADUATE TRAINING IN SURGERY

In Italy, degrees, including postgraduate diplomas within the medical area, are issued exclusively by the state, unlike in other countries, where degrees and diplomas can be awarded by professional or scientific associations.

Before 1990, postgraduate schools maintained a constant number of posts available by law; if the number of candidates was higher than the number of posts available, a competitive examination was necessary. Attendance was not compulsory, and the practice as well as the testing of the acquired professional background were insufficient, causing a remarkable disparity between theory and practice. The relationship between teachers and learners did not meet the needs of the latter category mainly because of the constantly growing number of students during the years. Postgraduate students were not supposed to receive any kind of remuneration.

This situation required a substantial change: for a decade, postgraduate schools have had a common guideline throughout the European community, becoming real residences.

Since 1990, postgraduate schools of surgery have been divided into 2 specialty courses: general and emergency.

In Italy, a common trunk with the other surgical specialties does not exist, and every school has its own training program. The graduate, for instance, can directly enroll in a specialty course of cardiovascular surgery or thoracic surgery; during the first years of the course the teaching of general surgery is required, as is a few months of attendance at a general surgery department as a surgeon in training.

The variety of posts available through the competitive examination, on the basis of qualifications and examinations, is established every 3 years on a national scale. Clinical departments of the schools of medicine and those of the national health care system participate in the training of postgraduate students. Postgraduate students are assigned the role of training assistant and, therefore, are paid; they are not allowed to have their own private practice.

The regulations of the school of general surgery encompass a 6-year course and prepare the student for the detection of theoretical and practical areas such as the following:

- A preparatory area, which envisages the acknowledgment of anatomy and surgery with epidemiological references of diseases.
- A clinical and instrumental diagnostic area, which envisages the acknowledgment of the procedure and of the diagnosis algorithm.
- A general surgery area, which envisages the acknowledgment of those requirements according to which procedure must be indicated, the risk evaluation, and adequate postoperative care.
- A surgical anatomy and operating technique area, which envisages the acknowledgment of anatomy rudiments and techniques to personally perform surgical operations.
- An interdisciplinary area, which encompasses the most widespread specialist diseases that require an emergency treatment as well as the detection of diseases requiring the intervention of specialists such as heart surgeons, neurosurgeons, and maxillofacial surgeons.

- An organizational and managerial area, which envisages the acknowledgment of requirements necessary to manage the surgical activity with regards to the characteristics of the facilities in which one performs the activity itself.

At the end of the 6-year course, to be admitted to the final examination for the diploma, the resident must prove complete professional qualification based on the performance of at least 50 major surgical procedures, with at least 15% as first surgeon; at least 120 procedures of average difficulty, with at least 20% as first surgeon; and, finally, at least 250 minor surgical procedures, with at least 50% as first surgeon. At least 10% of these procedures must be emergency operations.

The resident must also have served at least 200 hours in the emergency department; furthermore, with a great level of responsibility, and presenting all the related diagnostic and therapeutic activities, the resident must have directly assisted critically ill (at least 30), emergency (at least 150), and elective (at least 600) patients. This activity can be performed in university hospital facilities and in hospitals within the national health service.

THE HEALTH CARE SYSTEM IN ITALY

In Italy, the health care system is provided by public structures, private structures with accreditation and support granted by local authorities, and absolutely private structures. University general hospitals and hospital utilities belong to the public service and are completely autonomous as far as organization, income, management, technique, and accounts are concerned.

There are 1381 facilities for hospitalization and care (data from 1998) across the national territory; 61.3% are public and the remaining 38.7% are privately supported by local authorities.

As for surgical activity only, figures referring to 1995 are available and are classified according to diagnosis related group and the single apparatus. In 1995, the total number of surgical operations consisted of 321,335 digestive procedures, 760,597 hepatobilipancreatic procedures, 14,895 thoracic procedures, procedures for more than 72,000 malignant tumors (both operable and inoperable), and 83,022 procedures for the treatment of soft tissue diseases. These figures solely refer to so-called general surgery without taking into account any surgical specialty, eg, orthopedic surgery, gynecology, or ear, nose, and throat.

Italy spends 7.6% of its gross domestic product on health care. The availability of beds per capita is differently distributed and is higher in metropolitan areas and mainly in chief towns.

As in all western European countries, surgical activity focuses its main attention on 2 specific fields: oncology and traumatology. This is related to social developments that determine a longer average life expectancy, therefore increasing the risk of being affected by neoplasia. Emergency surgery is linked to trauma and finds its main application in injuries in general and in road accident injuries specifically.
Organ transplantation began in Italy in the mid-1960s with kidney transplantation. With a serious delay, compared with the United States, and after many controversies, Italy finally obtained legislation that allowed organ transplantation. During the first years, surgeons who first performed transplantations were not devoid of judicial problems. Moreover, they were opposed by some political parties that forced the surgeons themselves to appeal to international law, to the progress of medicine, and to the need for operating on an ill patient who would certainly die if the organ transplantation were not performed. At present, there is a law on organ donation that, although it underwent a troubled procedure, makes Italy an advanced country. The law envisages the introduction of “silent consent” to donation, which means that anyone who does not explicitly state unwillingness to undergo postmortem organ exploitation is considered in favor of the exploitation itself. Italy currently has 55 centers authorized by the Ministry of Health for 11 different kinds of transplantations. Obviously, in this case too, the most important centers are placed in the largest metropolitan areas.

**SCIENTIFIC SOCIETIES**

The Italian Society of Surgeons is the oldest Italian scientific society, whose foundation, carried out by 94 charter members, dates back to April 3, 1882. The aims of the society were to gather the experience of surgeons, to facilitate the exchange of different ideas, and to encourage the advance of surgical art and science in Italy.

To become a member of the society, postgraduate achievement in a surgical discipline is required; furthermore, the candidate’s curriculum must be countersigned by 2 members. Members are required to pay a year’s entrance fee. The society is a nonprofit organization aiming at the improvement of the surgical culture through experience.

The main instrument to carry out its activity is an annual meeting, which is held in Rome in the even-numbered years and in other Italian cities in the odd-numbered years. The structure of the meeting includes 2 biennial reports illustrating the state of the art of a specific subject, symposium, sometimes interactive symposium, roundtables, lectures, and refresher courses. Because knowledge undergoes ever faster changes, refresher courses represent a valid contribution to the permanent education of the surgeon.

There are approximately 5000 members, and they are divided into regular and honorary members. Honorary members, who are almost always foreigners, are exempt from the annual contribution as are ordinary members who have been in the society for more than 40 years.

The Italian Society of Surgeons encourages meetings with other related national societies, often organizing, during the meetings, international roundtables. From the Italian Society of Surgeons, a few minor surgical societies interested in specialist matters were founded and, later, with the passing of time, were made autonomous. During the meetings held in Rome, particularly in 1996, 1998, and 2000, the so-called minor surgical societies celebrated their own meeting so as to create a real surgical

**AREAS OF MAIN INTEREST AND FUTURE DEVELOPMENT**

During the past few years in Italy, surgical activity has undergone organizational and technological changes. In particular, there are 3 areas in which these changes have been significant: day surgery, video-assisted surgery, and, more recently, robotics.

**Day Surgery**

In the past few years, there has been a new trend to reduce the number of beds, motivated by the desire to avoid economic losses due to unnecessary hospital stays and use of expensive and sophisticated technologies. There is, therefore, a strong willingness to improve the efficiency and the quality of services. On the basis of these remarks, in Italy, day surgery has been developing for a few years; it involves outpatient surgery, “day cycle” surgery, and surgical operations that require a 24-hour hospitalization. Hospitalization is envisaged only for some operations of average and major surgery.

The proposed goals aim to achieve faster diagnosis and care and to reduce costs of stay and the social and working burden.

In Italy, day surgery is performed in 3 kinds of structures: autonomous units, hospital units equipped with separate operating and resuscitation rooms, and hospital units integrated with the existing resuscitation units. The autonomous unit is advantageous because it allows the planning and scheduling of the entire activity only for outpatient surgery; costs, therefore, are lower than those of other units, the care system is less affected by the hospital environment, different flows of patients to be separated are totally absent, and the unit itself is not affected by the different work burden of the hospital itself. Home care is guaranteed and, in the event of complications that require hospitalization, the transfer of pa-
patients to one of the agreed hospitals follows a preferential track. Autonomous units are mainly placed in reliable private structures; in public structures, the other 2 types of organization are dominant, although in a few regions, such as Umbria, Veneto, and Campania, day surgery programs in public autonomous structures have been developed. The greatest public European day surgery center has been opened in Naples; during the first 7 months of activity, 1880 procedures in operating rooms and twice as many surgical operations in the surgical day hospital room have been performed.

In Italy, day surgery encompasses all the fields of general and specialist surgery.

**Video-Assisted Surgery**

Since the end of the 1980s, in Italy, as in all the other western European countries, video-assisted surgery has been greatly spurred, dramatically reducing access trauma, postoperative pain, and the length of stay. At the beginning, the application was confined to simple operations concerning the abdominal area, such as colecistectomy, appendectomy, antireflux plastic surgery for the treatment of gastroesophageal reflux disease, and hernioplasty; as for thoracic surgery, the technique was performed for pulmonary wedge resections and, cardiomypotomy, and, finally, it was used in gynecology for a few simple operations. As techniques, instruments, and experiences have become increasingly refined, the field of application has become wider, making video-assisted performance of almost all surgical operations possible.

At present, video-assisted surgery is used in every Italian surgical center to perform the easiest and most common operations, such as those mentioned earlier; performance of procedures that involve major technical difficulties is left to highly specialized centers.

Future prospects envisage the application of robotics to video-assisted surgery to perform surgical interventions that require special dexterity and precision of the surgical maneuver.

**Robotics**

At present, the use of telematics and robotic techniques has been developing in different fields of surgery; through the combination of these 2 different technologies, it is possible to perform real surgical maneuvers using a remote-operating “surgeon” robot controlled by a surgeon operator through a computer. Therefore, one is witnessing the increasing development of “telesurgery,” ie, the application of telerobotics to surgery.

According to its complex meaning, telesurgery consists of the possibility of remotely performing (telemanipulating) any procedure that involves the crossing or the instrumental section of teguments, whether one wants to reach internal organs for diagnosis or therapy or not, through a remotely controlled robot (telerobotics) or in a virtually recreated environment (telepresence). Telesurgery can be classified on the basis of applied technologies and its applications.

In the past few years, technological evolution showed the feasibility of remotely transmitting a surgical gesture: a surgeon’s controlled robot. Through this method, it is possible to facilitate the performance of surgical maneuvers with higher precision compared with manual precision; there is also the possibility of intervening at the right time in such situations or areas in which the surgical team is not always available, or in contaminated environments.

In Italy, this research is conducted and developed at the Mechanical Engineering Department of the Politecnico di Milano, the Mitec Lab (microfabrication technology laboratory), the Advanced School “Sant’Anna di Pisa,” and the Department of Surgical Sciences and Medical Applied Technologies at the University of Rome “La Sapienza.”

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