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TRANSACTIONS
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PHILADELPHIA ACADEMY OF SURGERY

STATED MEETING, HELD JANUARY 8, 1912

The Vice-President, DR. GWILYM G. DAVIS, in the Chair.

THE ART OF SURGERY*

BY GEORGE G. ROSS, M.D.,
OF PHILADELPHIA

Fellows of the Philadelphia Academy of Surgery:

It is with mixed feelings that I take up the task of delivering the annual address to the Academy. It is a duly appreciated honor to have been asked to do so, but also one that carries with it a great responsibility. The high character of the work of this association, and the exalted position in the surgical world of its Fellows raises a standard difficult to live up to.

Surgery to-day is the outgrowth of centuries of accumulated experience and the thought of thousands of men. "No great thing cometh suddenly into being," and we may trace the beginning of the Art of Surgery into the dim past when history first begins to record the deeds of mankind.

Happily, to-day, Surgery stands upon firm ground—the art supported and enlightened by the science of surgery, yet let us not forget that essentially surgery is an art.

Science of whatever kind seeks to enlighten us as to the causes of things and to explain known phenomena in accordance with certain well known fundamental laws of nature. How vast is its scope; how great are its limitations. "Science," says Holmes, "is the topography of ignorance. From a few elevated points, we triangulate vast spaces, inclosing infinite unknown details. We cast the lead, we draw up a little sand from abysses we may never reach with our dredges. The best part of our knowledge is that which teaches us where knowledge leaves off and ignorance begins."

*The Annual Oration in Surgery.

And, if the professed scientist is he who from a height surveys and examines facts and attempts to correlate and explain them, are there not ever so many more who from a lower level, perhaps, discover and hand down to posterity known facts in a much more restricted field of observation.

Just as in all crafts the practical utilization of experience long preceded the explanation of phenomena, so has the art of surgery preceded the science, and even yet remains the essential factor in its usefulness.

Of singular appropriateness in distinguishing between the art and science of surgery, I may quote the late Dr. Alfred Stille's remarks upon the Essentials of the Art of Medicine. "I venture once more to repeat my life-long declaration of faith that every art must exist before its associated science, and that how much soever each may illustrate the other, both are essentially independent. Neither botany, nor chemistry, nor pharmacy, nor pharmaco-dynamics, nor physiology, nor bacteriology, is an essential part of therapeutics. Its true and only foundation is clinical medicine, the medicine which recognizes and treats diseases. Medicine, in this sense, is an art and not a science; its laws are rules established, not only by theory but by observation and experience. They are as various as the medicines employed or as the patients who take them; they must be modified by the nature, the form, the tendencies of the particular disease, by the external and internal conditions and relations of the patients. The certainty of a science depends upon the fixity or constancy of its elements; the uncertainty of the healing art is due to inconstancy, the fluctuating values of the elements involved in the disease, in the remedies, in the patient, and in the physician himself, elements which no science has ever measured or reduced to law, and which none probably ever will; but what science has failed to do for disease in general, and for classes of diseases, practical sagacity has accomplished for individual patients."

"There is a science, and there is an art of medicine, but the boundary line between them is not always clearly defined; for although we may arbitrarily separate the one from the other, it is evident that while both are independent in their nature, each tends to throw light upon the other—the science upon the art, by enabling us to group together empirical facts in an order

and arrangement which makes both the science and the art more intelligible; and the art upon the science, by providing it with a wider basis of facts for induction, and by tending through clinical experience to rectify the errors inseparable from the application of normal laws to abnormal conditions. The familiar anecdote, whether it be literally true or not, which relates that the law of gravitation was revealed to Newton by the fall of an apple; or that other equally striking story that oscillation of a chandelier suggested to Galileo the orbit of the planets, show that in the portion of the domain of knowledge where the laws are unchangeable, a sagacious mind may leap from a single fact to a boundless generalization."

The same thought is pursued upon a somewhat different line by Holmes in his essay on scholastic and bedside teaching. "We must not expect too much from 'Science' as distinguished from common experience. There are ten thousand experimenters without special apparatus for every one in the laboratory. Accident is the great chemist and toxicologist. Battle is the great vivisector. Hunger has instituted researches on food such as no Liebig, no Academic Commission has ever recorded."

Medicine, sometimes impertinently, often ignorantly, often carelessly called "allopathy," appropriates everything from every source that can be of the slightest use to anybody who is ailing in any way, or like to be ailing from any cause. It learned from a monk how to use antimony, from a Jesuit how to cure agues, from a friar how to cut for stone, from a soldier how to treat gout, from a sailor how to keep off scurvy, from a post-master how to sound the Eustachian tube, from a dairy maid how to prevent small-pox, and from an old market woman how to catch the itch-insect. It borrowed acupuncture and the moxa from the Japanese heathen, and was taught the use of lobelia by the American savage. It stands ready to-day to accept any thing from any theorist, from any empiric who can make out a good case for his discovery or his remedy. "Science" is one of its benefactors, but only one, out of many. Ask the wisest practising physician you know, what branches of science help him habitually, and what amount of knowledge relating to each branch he requires for his professional duties. He will tell you that scientific training has a value independent of all the special knowledge acquired. He will tell you that many facts are ex-

plained by studying them in the wider range of related facts to which they belong. He will gratefully recognize that the anatomist has furnished him with indispensable data, that the physiologist has sometimes put him on the track of new modes of treatment, that the chemist has isolated the active principle of his medicine, has taught him how to combine them, has from time to time offered him new remedial agencies, and so of others of his allies. But he will also tell you, if I am not mistaken, that his own branch of knowledge is so extensive and so perplexing that he must accept most of his facts ready made at their hands. He will own to you that in the struggle for life which goes on day and night in our thoughts as in the outside world of nature, much that he learned under the name of science has died out, and that simple homely experience has largely taken the place of that scholastic knowledge to which he and perhaps some of his instructors once attached a paramount importance."

Let it not be supposed that anyone should think of considering to-day the art of surgery as separate and apart from the science of surgery.

The Art of Surgery in its fullest and best sense avails itself not only of the facts which experience has demonstrated, but also of every aid which science, experimental and otherwise puts at his disposal. But he who would practise the art of surgery must rely first of all upon the accumulated experience of all who have preceded him.

And where a scientific theory or hypothesis runs counter to our knowledge of fact it must be cast aside. Sydenham, the great pioneer in medicine, says: "In writing therefore a history of diseases, every philosophical hypothesis which hath prepossessed the writer in its favor ought to be totally set aside." In a similar vein, Claude Barnard, the greatest of physiologists, states that "when you meet with a fact opposed to a prevailing theory, you should adhere to the fact and abandon the theory, even when the latter is supported by great authorities and generally adopted."

This great adherence to fact and abhorrence of pure theory has been a guiding principle with those who have most successfully practised the art of surgery.

No one would attempt to oppose the art and science of surgery to array the craftsman and the scientist on opposite sides.

The true surgeon practises his art with full knowledge of and reliance upon those aids which science alone furnishes. And to do this in the fullest sense of the word requires a man of many and diverse qualities.

Sedillot, himself one of the greatest of a brilliant group of French surgeons, early in the last century, says, he (the surgeon) must be strong, active and adroit, fertile in resource, persuasive, of an unshakable firmness, practised in solving the most difficult problems of symptomatology, for his diagnosis may be a question of life and death.

With Velpeau, he must give ear to the experiences of every one without regard to country, school or person.

The surgeon must develop his powers of observation to the fullest extent; no detail, however small, can be too insignificant for his attention. Superficiality is fatal to the practise of surgery. Things, apparently trivial, may change the prognosis of a case entirely.

And not only must the power of observation be trained, but with it there must be a keen sense to discern the actual facts, a fine discrimination between the real and the apparent. Experience must set its seal deeply upon him who aspires to the heights of the surgical art. Each case must carry its lesson, however slight. The work and experience of others should be weighed in the balance.

And, granted that the surgeon has those qualifications which are so necessary to him, what is it that will enable him to further advance the science and art of Surgery?

Primarily, it is the ability to profit by the experience of others, and the constant endeavor to add something new, seem it ever so trifling to the fund of acquired knowledge. Paré, in 1575, said of his surgery, "that posterity will not be able to surpass us (be it said without malice or offense) save by some additions such as are easily made to things already discovered."

How false this view of a truly great man was; what enormous strides have been made in the art of surgery and its allied branches within the lives of those present.

Fitz placed the pathology of appendicitis upon a firm basis. Fowler, Treves, Murphy, Deaver, Richardson, Oschner and a host of others have put his teachings to practical use.

Surgery of the Stomach, Biliary System and the Pancreas

has come into its own. The work of Matas on aneurysms and of Carrel and others on blood vessel anastomosis and transplantation have been the first great advances since Antyllus described his method of treating aneurysms and Paré first used the ligature to control hemorrhage after amputation.

Ferrier's epoch-making studies on cerebral localization have borne fruit in the work of Horsley, Keen, Cushing, Krause and others.

We are just at the beginning of an era of intrathoracic surgery, made possible by Sauerbruch and Brauer's use of negative and positive pressure apparatus. The whole field of thyroid surgery has been opened. Surgery of the prostate and kidneys and bladder has been made practicable.

We have achieved a constantly greater success in the treatment of peritonitis, for Fowler and Murphy, by utilizing physiological knowledge, have given us practical contributions to surgical art.

But in all these great advances the practical craftsman of the surgical art has been the one who has turned things discovered into actual benefits.

When Pasteur announced his all-important discovery that micro-organisms were the cause of fermentation, Lister, the practical surgeon, at once saw its value in its application to the treatment of wounds. His methods are our methods to-day, modified and simplified by constant use, at the bedside and in the operating rooms of the world. Their value has been tested in the retorts of practical experience and the favorable verdict has rested, as it always must, upon the approval of the practising surgeons and physicians.

As an instance, let us also consider the development of the symptomatology of gastric disease. Laboratory methods here misled the medical profession for many years, until the surgeon with his study of living pathology showed the true connection between lesion and symptom.

And how may we further progress? First and foremost by the study of what has been aptly called "living pathology"; the study at the operating table of pathology and diseased physiology *in vivo*. What correct idea does the post mortem examination of a patient who has died of an appendicael peritonitis give of an acute incipient appendicitis? Or what does the pic-

ture of a patient succumbing to intestinal gangrene as a result of strangulation teach us as to the methods of cure of the condition in its early stages?

The surgeon of to-day must study morbid anatomy not only at the autopsy table and in the museum but at the operating table, and how great is his advantage over the internist who does not see the wonders revealed by surgery.

What an ideal combination for the furtherance of learning, it would be to have present at every operation of moment, besides the surgeon, the internist and the pathologist, working in harmony, and each one exerting his special powers in the solution of the problem at hand. When, as is rarely the case, a marvelous man of medical science combines these three functions well, how wonderful are the results!

"When Fitz, soon after his classical monograph on Acute Hemorrhagic Pancreatitis, made the correct diagnosis in the case of a prominent citizen of Boston, the medical and surgical community applauded the brilliancy of that intellectual feat. That diagnosis was the result of pathologic observations in connection with a study of the clinical history; it was the fruit of years of observation in which there had been a direct and early demonstration of the pathology of the disease." (Richardson.)

And so, the true surgeon can not be too narrow a specialist. Specialism in modern surgery is necessary; but, even more necessary is the well-grounded thorough man, who combines with his highly specialized vision, openness to facts that lie beyond his immediate horizon and an ability to interpret them.

Let us use the laboratory and its findings to their full extent. Let us appreciate the benefits of scientific investigation in the solution of diagnostic difficulties. But, with Richardson, I believe that the tendency to-day is to return to the old-fashioned methods of diagnosis; the history, the touch and the tongue; the pulse; the indescribable picture as a whole, upon which many an experienced practitioner bases at times wonderful intuitive diagnosis.

The general practitioner is the greatest of all specialists. He specializes in individuals and in individual cases and not in diseases of a certain organ or organs. With him, as Osler says, must remain the final verdict as to the value of any surgical or medical procedure.

What I wish to do in this paper is to make a plea for the application to the problems of surgery, of those broader principles and insights which constitute the strength of the general practitioner. If, in the field of special surgery we can bring into use the abilities of men who see in the lesion of a particular organ, its near and remote effects upon the organism as a whole, we shall be on the verge of a great and new era of practical surgery. Results in surgery depend not so much upon the immediate outcome of a surgical procedure upon any diseased viscus or structure, as upon the more remote effects upon the body as a whole. And here lies one of the dangers of modern surgery. In the large surgical clinics of to-day there is a tendency to perform operations in great numbers and to accumulate great masses of statistical material, more or less correct as to technical details, but wholly lacking in value in a consideration of end results.

Every surgeon to make advances in his work should know how many patients have been, and how many have not been permanently benefited by his treatment.

We must do more than treat the disease; we must treat the patient. To treat the patient, we must know more than the symptoms from which he is suffering. We must know his characteristics, his hereditary tendencies, his environments, his idiosyncrasies, and his vital resistance. To do this takes time; to gain time, we must do one or more of several things. We must increase our capacity for work; or we must decrease the number of patients to correspond to our capacity for work; or we must by efficient organization, divide up the work so that these essential details are not overlooked or ignored.

You, as leaders of our profession, must ever be in close association with the family doctor. You must teach him; be at his elbow in times of stress; must impress upon him the fact of his heavy responsibility to his patient and the importance of his opinion and advice. You must teach the laity the added value of this service, which calls for corresponding remuneration.

You must stop the waving of the shining banner of Science as an excuse for mere numbers, and return to the more rational and safer ground of Doctor and Patient!

TUMORS OF THE MALE BREAST.

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THE infrequency of tumors of the male breast is explained by its rudimentary state, the physiologic inactivity of its glandular elements, and particularly by the fact that the conditions incident to pregnancy, which predispose to mammary disease in the female, are entirely absent.

The degree of frequency is well demonstrated in Williams's analysis of 13,894 primary neoplasms, which show that 2422 originated in the breast; of these, 25 occurred in males and 2397 in females. Therefore, 17.5 per cent. of all neoplasms occur in the breast, and when subdivided, we find that the female breast is relatively affected in 26 per cent., and the relative frequency in the male breast is 5 per cent. The influence of sex in the development of neoplasms is thus demonstrated. Williams estimates, in general, that females are twice as liable as males, the percentage proportion being 67 females to 33 males. In the breast, however, nearly 99 per cent. of all its neoplasms occur in females, and only about 1 per cent. in males. This illustrates the law that functionless, obsolete structure has but little tendency to take on the neoplastic process, which is most prone to arise in the sites of greatest post-embryonic developmental activity.

CARCINOMA.

In spite of the fact that carcinoma of the male breast, when compared with the same disease in the female, is relatively infrequent, there are a sufficient number of cases re-

ported in the literature to give to this affection a degree of considerable importance. This importance is further emphasized by a comparison of the disease in the two sexes, a study which tends to bring out many distinct differences.

Of the 25 tumors of the male breast collected by Williams, 16 were carcinomata, 3 sarcomata, and 6 various forms of benign growths. In 1885, Schuchardt collected 406 cases, 348 of which were malignant; Manger, in 1902, referred to 71 cases—some of these were probably included in Schuchardt's statistics. In 1901, Warfield collected 37 cases of cancer reported since the publication of Schuchardt's paper, and in 1906 Finsterer added 11 new cases. In addition to these, about 30 other cases have been recorded, making an approximate total of 500 instances of cancer of the male breast.

Carcinoma of the breast occurs considerably later in life in men than it does in women. In the latter, the statistics of various authors vary from 45 to 49 years, and in males the average age is about 55 years (50 years, Williams; 61.5 years, Keyser). The greatest number occurred in the seventh decade of life in both Warfield's and Manger's series, although a relatively large number also appeared in the fifth and sixth decades.

The disease may occur at an early age, as is seen in the case reports of Blodgett, Williams, Moore and Coley, in which the ages were respectively twelve, twenty and twenty-two years. The oldest case on record occurred in a man aged ninety-one (Lunn).

A definite history of injury to the breast is obtained in a sufficiently large number of cases to attach some importance to traumatism as a predisposing factor in the development of cancer. It was mentioned in 8 of 37 cases (Warfield), and Schuchardt found that contusions, small wounds, fissures and mechanical factors, were present in 25 of 406 cases. In those instances in which traumatism was followed by either blood extravasation or scar formation (Schuchardt, Dietrich, Moore), there can be little doubt that the carcinoma developed at the site of lowered vitality. In one of Dietrich's cases, after the absorption of a hæmatoma, a nodule remained, and from this a malignant growth began two years later. In a second case a blow was followed by an inflammatory tumor discharging pus, and at this spot a hard nodule developed and later became carcinomatous.

The effect of constant pressure is noted in the appearance of cancer in workmen, who, in their occupations, are accustomed to exert force in the breast region. These cases are so numerous that the etiologic importance of this factor cannot be overlooked. The chronic irritation of articles of clothing is also mentioned, and it is certain that constant rubbing in this manner seems to hasten the growth of the tumor, and certainly predisposes to ulceration in those cases in which the carcinoma has already developed.

The action of the process spoken of as adolescent mastitis in the production of benign tumors will be alluded to. That the same affection may cause a predisposition to cancer seems likely, to judge from the first case reported by the author, in which the malignant growth was preceded by several attacks of inflammation.

The effect of hereditary predisposition in the development of tumors has been mentioned by several authors, a family tendency existing in benign as well as in malignant tumors of the breast. Gangitano has recently reported two cases of benign tumors in which the families of both showed a predisposition to breast disease. According to Williams, there was a history of cancer in seven of 29 cases (24 per cent.). Of the seven cases, the breast was the seat of the cancer in three, and in three cases there was history of carcinoma in more than a single relative.

Traumatism, or some form of chronic irritation, tends to produce rapid enlargement of latent carcinomata, and the same factors are often instrumental in producing ulceration. The formation of an ulcer is more likely when the malignant process has extended to the overlying skin which becomes atrophic in appearance. The frequency of ulceration is noted

by many writers, occurring in 61 of 219 cases (Schuchardt), 9 of 26 (Williams), 13 of 37 (Warfield), 18 of 71 (Manger). About 30 per cent. of the cases, therefore, undergo ulceration, a percentage which is much higher than in the breast carcinomata of women.

The slow growth of the tumor probably accounts for the fact that from the time when first noticed until the patient came under observation, a period of 29.5 months elapsed on the average (Williams), 18 to 25 months (Finsterer). In females, this period is much less, and varies from 10 to 12 months. While the growth of the tumor is protracted in most cases and covers a period of many years in slowly growing scirrhous tumors, the length of time observed has been as short as two weeks (Moore), two months (Finsterer) and three months in the first case reported by the author.

Enlargement of the axillary lymph-nodes is observed in a majority of the cases (60 to 65 per cent.). In a few instances, no axillary enlargement was noted, and in cases whose duration was not longer than six months, the nodes were usually normal. After this period of time, as in the female, the lymphatics become affected regularly.

Some authors have found that the right breast is affected more frequently than the opposite one, whereas, other statistics place the degree of frequency slightly higher in the left. The average of a large series of cases, however, shows that the difference is so little that it is not of practical importance. The disease was bilateral in four of 88 cases (Williams), but did not begin as a primary bilateral affection in any case. Hansy reports a case in which the second tumor in the opposite breast developed so soon after the appearance of the first, that it can be regarded as an example of bilateral primary malignancy.

The clinical picture of the disease does not differ in many other particulars from that of the female. The growth, usually situated near and below the nipple, is small, hard and freely movable in the early stages. Slow growth has been mentioned, and depending upon that, we find that adhesions

to the surrounding parts with fixation of the tumor are late manifestations. The growth, in spite of its long duration, remains small, usually being the size of a small nut, and occasionally becomes as large as an apple. Pain is rarely a prominent symptom unless extensive infiltration or ulceration has taken place. In many cases, the tumor, although of a fairly large size, produced no symptoms. The nipple becomes retracted in about half of the cases because the cancer is situated close to the ducts. In a few instances, the tumor has extended to and destroyed the nipple (Warfield). Discharge from the nipple is rather uncommon, but may be bloody, milky or puriform in character.

The majority of the above symptoms, therefore, represent late manifestations of the cancer, the disease having infiltrated the surrounding parts. At this stage, the diagnosis is not difficult, but it may be so in the early stages when the tumor is small and freely movable. That the primary tumor may be overlooked and serious consequences arise from its presence, is learned from McConnell's case. The man, aged fifty-four, developed symptoms which suggested a pulmonary lesion, and a diagnosis of sarcoma of the lung was made. The breast was enlarged, but the examination did not disclose any definite tumor, so that a neoplastic process was not suspected. The autopsy disclosed metastases in many of the viscera, including the pleura and lungs, the primary tumor originating in the breast.

The malignant degeneration of benign tumors will be alluded to. Sudden growth of a pre-existing tumor, with fixation of the mass, and especially if present in middle-aged men, should always warrant the diagnosis of malignancy and call for its appropriate treatment.

The histologic examination of the cases shows that the carcinoma arises most commonly from the ducts of the gland and less frequently from the acini, as is to be expected from their lack of development.

Williams's hundred cases were divided as follows: acinous 91 (scirrhus 88, encephaloid 3), tubular 6 (cylinder cell duct

cancer), cutaneous squamous cell cancer, 3. While the scirrhous variety is most commonly observed, the relative proportion is not so high in Warfield's series, 11 of 26 cases being scirrhous cancers.

A peculiarity of the histologic examination is noted in the number of melanotic and squamous carcinomas contained in Williams's collections. Of the scirrhous growths, two were melanomas; and one of the three squamous carcinomata was a melanotic tumor. This frequency is explained by the fact that skin growths, in general, are much more liable to affect the male sex. The melanotic tumors also arise much more frequently in connection with structures of integumentary origin. The male breast being of this type and having lost most of its special characters, is in a process of reversion to the primordial cutaneous condition, and herein may be an explanation of its comparative proneness to melanosis.

The recurrent disease is found usually in or near the scar of the operation, or it may arise in the axilla or opposite breast. It is worthy of note that the carcinoma was present, on an average, 20.4 months before operation was undertaken in five recurrent cases reported by Finsterer. The duration of life from onset of the tumor in these cases averaged 51.4 months, in spite of the secondary growths. On the other hand, in exceptional cases, the disease assumes a rapid growth, and its highly malignant character is manifested by recurrence a few months after operation. Manger states that 70 per cent. of the cases died of recurrence or metastasis, and that recurrence arose in 19 of 72 patients in a few months to 5 years. There were 9 recurrences within 6 months of the operation, 3 within 1 year, 2 within 2 years, 3 within 4 years, 1 within 5 years, 1 within 6 years. The tendency toward late recurrence 5, 10 or more years after operation, which is rather common in women, does not exist in men, the majority of the cases reported recurring within a comparatively short time, and a few living 5, 6 or 8 years before local recurrence arose.

Secondary growths involving the internal organs are most

commonly found in the liver and lungs. In 5 of 88 cases (Williams) deposits were noted in the bones; both clavicles and tibiæ, the vertebræ, the sphenoid and base of the skull were involved in one case each.

The operative mortality in Williams's statistics was 36 per cent., two deaths occurring in 56 amputations of the breast. Death in these cases was due to sepsis; this complication is practically unknown at the present day. The operative mortality at present is *nil*, the 34 cases collected by Warfield in recent times, and 30 I have reviewed, all recovered.

It is impossible to judge accurately concerning the percentage of cures because this fact is mentioned in a comparatively small number of cases. Finsterer was able to find but six cases in the literature in which it was stated definitely that recurrence had not arisen. Two of the cases in his series lived 21 and 11 years; Blodgett's case 5 years, and the second case reported by the author has lived 3 years without further trouble.

The following cases of carcinoma of the male breast are reported for the first time:

Case I (Service of Dr. E. B. Hodge, Presbyterian Hospital).—Patient aged fifty-five, noted three months ago a small nodule below the breast. He states that when a boy the breast became red, painful, and swollen, and several times during adult life, similar attacks of inflammation occurred. At these times there was a slight discharge of clear fluid from the nipple. There was no history of trauma to account for the attacks. On examination, a hard nodule, the size of a hickory-nut, was found below the nipple, which was slightly retracted. The mass was adherent to the underlying tissues and was painless. The skin was atrophic in appearance and at a point over the tumor was brawny and infiltrated. One enlarged lymph-node was palpable. The tumor, when removed, was dense and stony hard, and showed microscopically a typical scirrhous carcinoma. The single enlarged lymph-node was not involved. There has been no recurrence nine months after operation.

Case II (Service of Dr. C. H. Frazier, University Hospital).—R. C., male, aged forty-eight, was admitted with the history

of a recurrent tumor of the left breast. The growth appeared two years ago without cause and without pain, and seven months after it was first noted, the lump and nipple were excised. He remained well until a few months ago when a second nodule appeared and was excised. The histologic examination showed carcinoma in both instances, and the patient was finally persuaded to accept radical operation. The axilla contained several enlarged nodes which were removed, and, beneath the scar of the first operation, several nodules were found. These and the axillary lymph-nodes showed infiltration of a scirrhous type. No recurrence at the present time, three years after last operation.

SARCOMA.

Sarcoma of the female breast occurs in 1 to 2 per cent. of the cases, and as an affection of the male gland must be regarded as a very rare condition. In Schuchardt's statistics, only six cases are mentioned in which the diagnosis was confirmed by microscopic examination, and the three instances occurring in Williams's collection of 2422 tumors of the breast have been alluded to. In 1906, Finsterer found 12 sarcomas of the male breast in the literature, three of these he reported for the first time. Connell a year later reported a case occurring in a male aged twenty-five and thoroughly reviewed the subject, collecting, in all, 34 cases.

The clinical features of this form of malignancy resemble carcinoma in some particulars, and, in others, differ sufficiently to justify a diagnosis between the two. Finsterer has found the average age to be considerably lower than that of carcinoma—sarcoma 45.6 years, carcinoma 55 years. The following table represents the age incidence (Connell):

20 to 25 years	4 cases
30 to 35 years	3 cases
35 to 40 years	2 cases
40 to 45 years	3 cases
45 to 50 years	1 case
50 to 55 years	5 cases
55 to 60 years	1 case
73 years	1 case

The tumor begins as a small, freely movable nodule, which grows rapidly as a rule, reaching the maximum size within a year. Sarcomata in some cases may become as large as an orange or a child's head. The skin is involved in a comparatively small number of cases, therefore the formation of ulceration is seen much less frequently than in carcinoma. Fixation of the tumor to the underlying tissues is a rather late manifestation. Involvement of the axillary lymph-nodes, on the other hand, occurs frequently. In 20 cases Connell found axillary involvement mentioned 9 times; skin involvement 4 times; fixation to fascia 3, and no adherence 7.

While the tumors grow rapidly in the majority of cases, occasionally a period of several years elapses before they reach any considerable size, the average duration of the disease being much less than carcinoma. Family predisposition and traumatism play a less important rôle than they do in cancer, for Connell has found but two instances of the former and one of the latter.

Histologic examination has disclosed all varieties of sarcoma; the spindle-cell type, which predominates, is the least malignant. The varieties are subdivided as follows: spindle-cell 12, round cell 7, chloroma 1, cystic 3, and melanotic 3.

Some of the cases which have been reported should not be classified as breast tumors because they have originated in the skin, as pigmented moles or nævi. Sarcoma is reported to have developed from a nodule in the breast of 22 years' duration, and from other benign tumors most likely adenofibromata in nature.

The final result of the operative measures has been mentioned in comparatively few cases. Finsterer could record but one case of cure; in this there was no recurrence after 11 years. Connell mentions 11 recoveries. One case free for 2 years after the fourth operation; one recovery with development of keloid; recovery with development of erysipelas on second day, no recurrence after 11 years; one recovery with inoperable recurrence, after one year Coley's treatment, recovery. Deaths three; death after second operation within five months, one case.

BENIGN TUMORS.

Of the 25 tumors in the male breast, recorded by Williams, 16 were cancerous, 3 were sarcomatous and 6 were benign. Schuchardt's first collection included 274 malignant growths and 21 benign ones. Numerous reports of benign growths of the male breast point to the fact that the pathology of these conditions does not differ essentially from that of the female, and that the various tumor formations so common in the latter may find their counterpart in the male gland.

The least common benign tumors occurring in either the male or female breast are those composed of a single type of tissue. These cases are so rare that they are of most interest from a pathologic stand-point. The cases which have been reported by various authors include fibroma, myxoma, chondroma, angioma, adenoma, and myoma. Several instances of true lipomata presenting noteworthy features are on record. The tumors, for the most part, occur in middle-aged men, are soft, and occasionally reach a size to cause real discomfort. They are painless, of slow growth, and require several years to attain any considerable proportion. The lipoma observed by Queirel became as large as a child's head in 15 months, while in Masse's case the growth was congenital, and grew more rapidly, becoming the size of an orange in nine months. While the tumor in the last case occupied the mammary region, there is some doubt as to whether it and several other lipomata of congenital origin originated in the breast.

The most common tumor described is the fibro-adenoma, which Woodyatt divides into two groups:

(1) Sharply circumscribed form, dense tumors which arise without traumatism in the breasts of young men and run a painful clinical course. Microscopically, there is little or no evidence of inflammation, but all the characteristics of the fibro-epithelial tumors which occur in the breasts of young females, to which they are analogous.

(2) Diffuse or ill-defined growths which may occur at any age as the result of traumatism. Microscopically, these enlargements have the same structure as those of the first group. Signs of inflammation are more in evidence, however, so that their differentiation from chronic inflammation may not be easy. They are called fibro-adenoma because of their progressive growth and microscopic structure. This formation corresponds to the "traumatic indurations" of some writers.

Fibro-adenomata of the male breast vary greatly in size. The tumors seen in boys in conjunction with inflammatory symptoms (adolescent mastitis) are usually small. Their growth is generally slow and progressive, several years elapsing until they reach the size of a walnut, an egg, or even an orange. In Whelan's case, the tumor began at the age of eighteen, and when removed, eight years later, weighed one-half pound. Rapid growth of the tumor may occur, as is seen in the instance recorded by Griffin which is of interest also because the growth was bilateral:

> The patient, aged forty-five, was struck seven weeks previously over the left breast, after which a tumor slowly grew until it reached the size of a hen's egg. Four weeks later a tumor in the opposite breast was removed; this growth was noticed one week after the first operation. Both tumors were fibro-adenomata on microscopic examination.

The interval between the appearance of the second tumor in the opposite breast is not always so short, as is indicated in Gangitano's case:

> A fifty-seven-year old man had a small tumor removed from the right breast sixteen years ago. During the past four years the left breast gradually increased in size, becoming denser than normal, painful on pressure but freely movable, and several enlarged axillary lymph-nodes developed. The breast was amputated, and microscopic examination showed a fibro-adenoma.
>
> A second instance reported by the same author occurred in a male aged sixty-six, in whom bilateral tumors developed over a period of seven or eight years, and reached the size of an apple in the right and a hazel-nut in the left breast. The latter was removed and found to be an adeno-fibroma.

Many cases give the history of antecedent injury to the breast. This effect is mentioned by Denenholtz in a case of bilateral growth in a boy of fifteen years. It is doubtful if

traumatism plays an important predisposing rôle, as the injury is much more likely to call attention to a tumor already present in the breast, a fact commonly observed in growths in the female gland.

During the past few years considerable attention has been directed to the fact that all benign tumors of the breast are potentially malignant. In the female the possibility of carcinomatous degeneration is almost in direct proportion to the amount of epithelial hyperplasia in the primary tumor. We find, therefore, that the fibrous type of the fibro-epithelial tumors becomes malignant in a relatively small per cent.; and that the tumor formations with active proliferation in the ducts and acini undergo malignant change in as high as 24 per cent. of the cases. In other words, the adenofibromata rarely degenerate, whereas the cystadenomata and the cases of abnormal involution frequently become malignant.

It is to be expected, therefore, that tumors of the male breast should undergo similar degenerative changes, although the relative proportion should be less as the factors conducive to epithelial hyperplasia are not so active in the male. Carcinomatous formation in a pre-existing fibro-adenoma has been reported by Owens and Eisendrath.

The patient, aged fifty-six, noticed a slight depression of the nipple and a nodule, the size of a pea, in the right breast. The condition remained unchanged for 36 years, when a small scab formed on the nipple which would bleed slightly when the scab was removed. The nodule began to enlarge one year ago, and formed a hard tumor one inch in diameter, sharply circumscribed from the surrounding skin. The overlying skin was atrophic, bluish in color, and immovable. The microscopic examination. after extirpation of the tumor, showed a scirrhous carcinoma, which undoubtedly arose in the benign tumor described.

What relationship exists between adolescent mastitis and adenofibroma is not clear, although Woodyatt suggests that the former is a separate affection, as a sequel to which the adenofibroma may develop, for many of the cases of sharply circumscribed adenofibroma in youth have developed in the course of what appeared to be "adolescent mastitis." The

following case which I observed for a period of three months seems to bear out this theory:

The patient, aged twelve, complained of pain and burning in the right breast, which, when examined, was slightly larger than the opposite one. The skin was red, but other evidences of inflammation were absent. The pain and swelling subsided under local treatment and the boy was discharged. He returned two months later, complaining of a lump in the breast, which, he said, was noticed several weeks after treatment was discontinued. The tumor was the size of a pea, hard, freely movable, tender on pressure, and situated below and to the outer side of the nipple. The growth was excised under local anæsthesia. The microscopic examination disclosed a fibro-epithelial tumor, in which the periductal fibrous tissue predominated. The ducts and acini were relatively few in number, and were lined with several layers of cuboidal epithelium. In a few acini more active hyperplasia caused the formation of solid plugs of cells, which were, however, non-invasive in character. Diagnosis: fibro-adenoma.

The above case illustrates the type of tumor occurring in Group I, and the following instance may be taken as an example of Group II:

Male (service of Dr. John B. Deaver, German Hospital), aged sixty-eight, noted a lump three months ago in the left breast. Little attention was paid to it until two months later, when it became slightly painful and enlarged progressively. The mass was situated under the nipple, and felt as large as a goose egg, but was not tender. No enlargement of axillary lymph-nodes was noted. The growth was excised. It was made up of fairly dense white tissue, which was not encapsulated as is the ordinary fibro-adenoma. Microscopically, a fibro-epithelial process was seen. The periductal tissue showed proliferation, was fairly cellular and contained many round cells. The acini were more numerous than normal, the lining cells were cylindrical and occurred in several layers. The degree of epithelial proliferation was excessive, but the cells did not extend into the periductal tissue. Slight dilatation of the ducts was seen, and in some of

the cystic cavities, small papillæ were present. Diagnosis: adeno-fibroma.

The cystadenomata of the breast are not so common as the fibro-adenomata, although a number of cases have been recorded in the more recent literature. The line of demarcation between the cyst- and fibro-adenomata is not sharp in all cases, indeed it is contended by some that there are transition stages of one to the other. From the pathologic standpoint, however, it is of importance to make this distinction because the cystadenomata are more likely to carcinomatous degeneration, and from the clinical point of view they differ from the fibro-adenomata when cyst formation is prominent. The tumors are usually small and well circumscribed, but may become as large as an orange when cyst formation is extensive. The case recorded by Worbs caused considerable inconvenience on account of its large size, and for this symptom alone surgical intervention may be sought. The tumors are seen usually in men of advanced years, most of the cases occurring between the forty-fifth and sixtieth years of life, whereas the fibro-adenomata are frequent in youth. In Spencer's case the tumor was present since birth, enlarged rapidly when the boy was four years of age, and reached the size of an egg within three weeks. The breast when removed contained multiple cysts, the contents of which were bloody.

The cysts give to the tumors a definite fluctuation in some cases, and the fluid may be bloody, clear, or dark brown. Milky fluid was observed in a cyst occurring in a child eighteen months of age (Carpenter). The tumor was treated by aspiration, so that its true nature was not ascertained. In many instances papillary excrescences are present in the cysts, and these cases should be classified as papillary cystadenomata.

The following case represents an example of cystadenoma, the differentiation from fibro-adenoma being impossible clinically, as cyst formation was inconspicuous.

The patient, aged twenty-seven, noticed eight years ago a very small painless lump under the left nipple. It remained stationary until last year, when rapid enlargement took place. The patient attributes the growth to traumatism caused by boxing. The tumor, at the time of operation, which was performed by Dr. H. T. Harvey, was the size of a hen's egg, firm, movable, with skin and nipple appearing normal, and on palpation was tender. The mass, when removed, was firm in consistency, white in color and contained small cysts scattered through the tissue. The cyst walls were smooth. Microscopic examination showed a dense fibrous stroma in which a few ducts and a large number of regular acini appeared. The epithelial cells were increased in number, forming a lining composed of several layers of cuboidal cells which were greatly compressed in the dilated acini. The cyst formation was seen in both the ducts and acini, and in many of the latter, minute papillæ projected into the lumen of the dilated spaces. Diagnosis: cystadenoma.

Cystadenomata may also undergo malignant degeneration as demonstrated by Peachell's report:

The man, fifty-eight years of age, had an abnormal development of both breasts, and in the left one, a tumor which began two years ago. The growth was small, irregular, soft, non-adherent to the skin or underlying tissues, and discharged a bloody fluid from the nipple. It was diagnosed a duct papilloma. A year later the growth presented a greatly altered picture: it was hard in consistency, adherent to the skin and pectoral fascia. The bloody discharge continued from the nipple, which became retracted. The breast was removed and the tumor found to be a scirrhus. The patient died of an intercurrent disease nine months later without recurrence or metastasis of the cancer.

CONCLUSIONS.

1. Carcinoma is the most frequent tumor of the male breast.

2. The disease is seen later in life, grows slower, ulceration is more common, and traumatism plays a more important rôle than in women.

3. The operative mortality is *nil;* but the percentage of cures is probably much lower than in the female.

4. Benign tumors are subject to the same malignant degenerations, as are similar tumors in the female.

5. Adenofibroma is the most frequent type of benign tumor encountered, although all varieties have been met with.

6. Adenofibroma in young men may be produced by the affection termed "adolescent mastitis."

The author desires to express his thanks to Dr. John B. Deaver, Dr. Charles H. Frazier, Dr. E. B. Hodge, and Dr. H. T. Harvey, for permission to report the cases mentioned.

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Dr. John H. Gibbon said that during the last ten years he had operated upon four cases of tumor in the male, a comparatively rare disease, and as these four cases present a variety of tumors he detailed their histories, as follows:

In 1903 at the Pennsylvania Hospital he had a patient, a man 21 years of age, a shoemaker, who said that in his work he was accustomed to putting the leather against his chest and cutting it. This man had had a tumor for one month, hard, and with glandular involvement in the axilla. The growth appeared at the time of operation to be malignant, and he therefore removed the breast, the pectoral fascia, and glands of the neck, but not the muscles. The pathological report was adenofibroma. The axillary glands were inflammatory.

In 1910, at the Jefferson Hospital, he operated upon an elderly man who had had a tumor for seven or eight years, undoubtedly carcinoma, and it was so reported by the laboratory. The growth had ulcerated and involved the nipple and an area around it. He made a complete excision and used the X-ray afterward.

In May, 1911, he had another patient, a man 66 years of age, who had a large tumor of the breast, movable, ulcerated, which had existed for a number of years and had been treated in London by a quack with caustic. This proved to be a spindle-celled sarcoma. This man had a number of tumors over the body, which appeared to be lipomata, and it was thought that this tumor of the breast might have begun as a lipoma and undergone that rare change to sarcoma as a result of the irritation of the treatment received, but Dr. Longcope, who examined the specimen, did not agree in this, thinking the growth had begun as a sarcoma.

Dr. Gibbon had another case in an adult, a physician 73 years of age, who had a hard tumor in the left breast which was quite pendulous, the tissues being very flabby; he was quite sure it was a malignant growth, though there was no glandular involvement. The man suffered at the time from a very bad cardiac disease, from which he died suddenly a few years later. He had had a number of attacks, and Dr. Stengel advised against the use of a general anæsthetic, and therefore the breast was removed under infiltration anæsthesia. The growth proved to be a fibro-adenoma of the diffuse type. There was no recurrence. He had operated on one case of tuberculosis in the breast in the male, the patient being admitted to the Jefferson Hospital with this diagnosis. The breast was amputated. This man had previously had both testicles removed for tuberculosis.

Dr. Edward B. Hodge said the case of his mentioned by Dr. Speese was the only one he had operated on. It was in-

teresting from several standpoints, one of which was the previous history of mastitis. This had been entirely forgotten by the patient. He had had several definite attacks of inflammation of the gland with discharge from the nipple, beginning at 15 years of age and reappearing at varying periods. He was 55 years of age when seen by Dr. Hodge. He had also been impressed by the great difficulty of covering in the space left after doing a complete operation on men because of the lack of adipose tissue over the breast.

Dr. William L. Rodman agreed as to the rarity of benign neoplasms in the male breast. He had seen but two such cases, one of rather extensive fibro-adenoma, in a man about 35 years of age, which proved benign in character; another in a young boy who had been struck in the left breast with a base-ball. This patient was about twelve years of age and the appearance of the breast, especially the enlarged veins, was quite suggestive of sarcoma. A clinical diagnosis of probable sarcoma had been made, but after removal it turned out to be inflammatory. He had never seen a sarcoma in the male breast. He had, however, seen nine cases of carcinoma in the male breast, three of these in negroes. The first case he ever saw was at the Jefferson Hospital in 1879 or 1880 in a negro. The point he wished to emphasize—one which had already been mentioned by Dr. Speese—is that the time at which carcinoma in the male breast appears is considerably later than in the female. Furthermore, he thought that trauma as an etiological factor is far more important in cancer of the male than it is in cancer of the female breast. In two of his cases seemingly a direct connection between trauma and the growth appeared certain. One was a shoemaker who was in the habit of resting his last against the left breast; the other was in a laborer who in using the shovel was in the habit of resting it on the breast in his work. Operations for cancer in the male breast should give a better result than similar conditions in the female.

SUTURE OF FRACTURE OF BOTH PATELLÆ, UNDER INFILTRATION ANÆSTHESIA.

Dr. Charles F. Nassau reported the history of a man, aged 65 years, who, on October 3, 1911, slipped on a muddy street and fell, sustaining transverse fractures of both patellæ. He

was a man with advanced arteriosclerosis, and he had been for some time under the care of Dr. George DeSchweinitz who was treating him for a grave eye condition. The patient's blood-pressure was very high and he had albumin in his urine. He was an extremely intelligent man who readily grasped the danger of a general anæsthetic. His consent and co-operation were obtained to operate under infiltration anæsthesia.

Operation was on October 9, 1911: The infiltrating solution was made by dissolving one tablet in 50 c.c., and one tablet in 100 c.c. of normal salt solution. Each tablet contained cocaine, gr. ¾, adrenalin, gr. 1/400.

A skin flap was raised in exposing each patella. The right patella was drilled and sutured with very heavy silver wire. On the left side a heavy braided silk suture was placed around the fragments without drilling. Both wounds closed without drain. Silver leaf dressing.

The post-operative course was uneventful. Healing perfect. At this date, 12 weeks after operation, the patient writes that he can walk 8 to 10 blocks daily without pain or fatigue. There is a full range of motion in both knees.

Dr. John H. Jopson said that while he had not wired any patellæ under local anæsthesia, yet in one patient he sutured the quadriceps tendon to the patella, it having been torn from the bone. This old lady had advanced cardiac disease, she could not lie down, and suffered from more or less continuous dyspnœa, so that he did not dare give a general anæsthetic and used local anæsthesia, opening the joint during the operation practically as freely and widely as did Dr. Nassau. The patient made a rapid and complete recovery, however, without any infection of the wound.

Dr. George G. Ross said that local anæsthesia is a method often condemned because the man who is using it does not know how to use it correctly. He had used it in many instances, such as in the removal of bunions, whitlows, and minor surgery, with satisfactory results except in two instances. One of these was a healthy young woman with a lipoma of the shoulder; she was very much afraid of ether and he consented to operate under a local anæsthetic. She had a violent convulsion. Another case was a man 58 years of age with a large bunion. He injected the area with a 1 per cent. solution of cocaine, using, he should estimate, between 25 and 30 drops by the infiltration method.

The man inside of two minutes had a violent convulsion. He finally made a good recovery though he was mentally disturbed for twenty-four hours. In these two cases the results might have been due either to the strength of the solution or to the idiosyncrasy of the patients.

The speaker had had experience with quinine solution in six cases. One was an amputation of the toe, the other five were circumcisions. He concluded not to try it again owing to the extremely bad results obtained; the wounds sloughed over a long period of time and behaved very badly.

Dr. Charles F. Nassau (in closing) said that one should avoid the use of strong solutions of cocaine. A 1 per cent. solution of cocaine is strong enough under any circumstances. Too strong solutions, and also the use of tablets picked up indiscriminately from a table in the operating room which may have been handled by nurses, are more often the sources of infection than any inherent qualities in the tablets. The tablets he used are sterilized in little vials by dry heat, and he had never seen any wound where he had used them become infected.

OPERATION FOR ANEURISMAL VARIX OF THE POPLITEAL VESSELS.

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OF PHILADELPHIA.

Gross Professor of Surgery in Jefferson Medical College of Philadelphia.

Longitudinal incision of the popliteal vein. Suture of the opening into the artery from within the vein. Transverse division of the vein on each side of the opening with utilization of the isolated portion of the vein wall for a superimposed flap which was laid over the line of sutures in the artery. End-to-end union of the divided vein.

History.—Miss J., aged twenty-nine, white, native of New Jersey, was admitted to the Jefferson Hospital October 17, 1910. The previous July (something over three months before admission) the patient was accidentally shot. The weapon was a parlor rifle. The bullet, which was a No. 22 calibre, entered about the centre of the left popliteal space posteriorly and emerged anteriorly after passing through the head of the tibia. The knee-joint was not opened. The hemorrhage was moderately severe for a short time but soon ceased. The wound was dressed antiseptically and healed in a few days. A few hours after the accident the patient became conscious of a peculiar and annoying sensation in the popliteal space, which sensation has been continuously present ever since and has undergone a gradual increase. She describes it as a vibration or thrill that is like "feeling a roar." The thrill is and has been accompanied by marked pulsation, and both pulsation and thrill are growing more distinct every week. The patient has had no pain, although the leg has been and is weak. She has been wearing a rubber stocking because of swelling.

Examination on Entrance.—A small, depressed, white, irregularly circular scar is visible in the middle of the left popliteal space. A large and rather irregular cicatrix is noted below and to the outer side of the patella.

The leg and foot are a little swollen, somewhat œdematous, and decidedly pale when compared with the same parts of the

opposite extremity. The pulsation in the dorsalis pedis and the posterior tibial is very much weaker than in the corresponding vessels of the opposite side. The patient complains that the foot feels cold and it is distinctly colder to the examiner's touch than is the other foot.

The superficial veins of the leg and thigh are much enlarged and are tortuous but do not pulsate. The blood in the superficial veins flows in the normal direction. When the fingers are placed upon the surface over the popliteal space, a very distinct thrill is experienced. It is continuous and is characteristically the "purring thrill" described by Professor Matas and others. This thrill extends over an area from several inches above to several inches below the popliteal space, but is most marked over the middle of the space. It is most distinct at each cardiac systole. A murmur is heard on listening through a stethoscope. From the popliteal vessels a loud and continuous buzzing or purring murmur is heard, and this murmur becomes temporarily louder at each cardiac systole, that is to say, with each accentuation of the thrill. The stethoscope enables us to hear this murmur for several inches above the popliteal space and as low down as the ankle, but it is most marked over the popliteal vessels. When the thigh is raised to a vertical position, the thrill and murmur cease to be continuous and become appreciable only during cardiac systole. This observation accords with the observation made by Nélaton upon a case many years ago. Compression of the femoral artery in the thigh at once completely abolishes both thrill and murmur. There are no signs of trophic disturbance in the leg. The patient complains somewhat of aching, episodes of burning, and sensations of cold in the leg, and she walks stiffly and with difficulty. The pulse-rate is 70. Her general condition is excellent, and she is positive that the thrill is growing progressively worse. The condition is clearly one of arteriovenous aneurism.

[*Note to History.*—It is well known that a small percentage of cases of arteriovenous aneurism tend to spontaneous cure, but this event is too rare to be anticipated in any case, and it certainly is not to be anticipated when the signs of aneurism are growing worse instead of better. It is well recognized that many cases of arteriovenous aneurism last for years without causing

grave danger or even serious annoyance. This statement, however, applies to the trouble when it arises in the neck and upper extremities, and is not accurate when we are speaking of the lower extremities.

In a lower extremity the lessening in the amount of arterial blood distributed to the parts below the aneurism and the increased impediment to the venous return produce sooner or later serious or even grave trouble from failing nutrition of the parts, and difficulties born of venous engorgement are almost certain to arise.

In view of the fact that in this patient an insufficient amount of arterial blood is being distributed to the periphery, that the veins are much engorged, and that the condition is not improving but is growing distinctly worse, it seems advisable to recommend an operation.]

Operation (October 22, 1910).—Five days after her admission and with the valued aid of my friend and colleague, Professor Francis D. Stewart, I operated upon Miss J. My intention was to open the vein by a longitudinal incision, suture the opening into the artery through the open vein, and then close the opening in the vein wall, but I was obliged to modify this play by the developments during the operation. After etherization and with the patient supine, an Esmarch bandage was applied from the root of the toes to below the knee, at which point the band was applied and the bandage removed. After the extremity had been held for a time in a vertical position an Esmarch bandage was applied from above the knee well up upon the thigh, at which point the band was put in place and the bandage removed. The patient was then placed prone.

A longitudinal incision about six inches in length was made over the left popliteal space, and the vessels and the nerve were dissected free from the surrounding structures from above downward to the centre of the space. It was found that the vein and artery were directly fused somewhat below the centre of the space. There was no intervening sac. The artery distal to the point of fusion was small, but proximal to the same point was much dilated though not saccular. The vein distal to the point of fusion was very much dilated and much thickened. How far this thickening and dilatation extended could not be deter-

mined. The vein above the point of fusion was also enlarged and thickened. A longitudinal incision was made on the outer side of the vein, the opening into the artery found and sutured. The suturing was effected by means of interrupted sutures of No. 0 iodized catgut passed vertically and like Lembert sutures. The longitudinal incision in the vein and the sutures passed about the opening in the artery are shown in Fig. 1.

On tying the sutures, it was found that so much of the vein wall had been drawn in by the stitches that the calibre of the vein was greatly lessened (Fig. 2). It was considered useless to attempt restoration of the vein by the method we had at first contemplated, therefore the vein was divided transversely on each side of the point of fusion to the artery, and this portion of vein wall was used as a flap and superimposed over the suture line in the artery and was sewed to the artery by catgut stitches (Figs. 3 and 4). Thus we used a flap of vein to strengthen the sutured artery at that point. The flap was about one inch in length. The two ends of the vein were then brought together. As the lower end of the vein was the larger, the upper end was invaginated into the lower end and fixed there by four catgut sutures. The junction was re-enforced by a few catgut sutures passed through the external coat of the vein at the line of junction. The tourniquets were removed and the blood jumped into both vessels. The blood in the vein was moving toward the body. The artery pulsated strongly and there was not a bit of leakage. Bleeding vessels in the popliteal space were caught and tied. The wound was closed by silkworm gut sutures and no drainage was employed. The knee was placed in a position of semi-flexion over pillows.

The patient made an uninterrupted recovery. A week after the operation the stitches were removed, and day by day the leg was straightened out a little. For a couple of weeks the leg swelled a little but never notably.

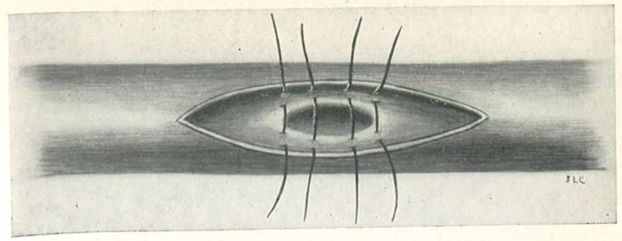
November 16: She was gotten up on crutches (a little over three weeks after operation).

November 24: She began to bear weight on the leg, still using crutches.

November 28: She left the hospital still using crutches as an aid.

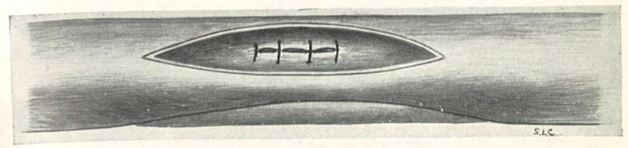
A month after this she put aside the crutches and walked

FIG. 1.



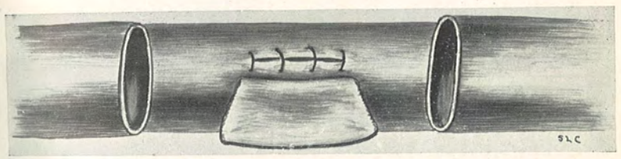
Longitudinal incision in the vein, and sutures passed through the margins of the arterial opening.

FIG. 2.



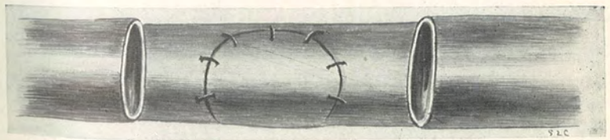
Sutures tied. Calibre of the vein greatly lessened by doing so (the diminution in calibre was more decided than is shown by the diagram).

FIG. 3.



Flap of vein left in place after transverse division of the vein at two points (the flap was larger than is shown by the cut).

FIG. 4.



Flap of vein sewed in place upon the artery so as to cover in and reinforce the sutures in the wall of the artery.

naturally. At the present time (October 20, 1911), which is a year and one month after the operation, she is in excellent condition, and walks easily and comfortably. The leg is free from swelling, pallor, and sense of coldness. The pulse in the dorsalis pedis and posterior tibial of the damaged side seems to be as good as the pulse in the corresponding vessels of the sound side. The superficial veins are much smaller though still visible. It would seem that it is justifiable to regard this case as a complete cure.

The interesting points about this case are the following:

1. That the symptoms appeared within a few hours of the accident. We know that symptoms may appear at once or in a very few hours, but as a rule they do not appear until weeks or even months have elapsed.

2. That although this was a gun-shot wound there was no intervening sac between artery and vein. The condition was an aneurismal varix and not a varicose aneurism. Of course a sac may have been present but have shrunken up and disappeared, although the fact that only three months had elapsed between the injury and the operation makes such an event improbable.

3. That it was necessary to destroy the vein in order to suture the artery. Perhaps this destruction could have been obviated if the sutures through the arterial opening had been passed in the direction of the long axis of the artery instead of vertically. In another case I would not pass them vertically, that is, I would not pass them at right angles to the long axis of the artery, but would insert them in the long axis.

4. That the destruction of the vein clinically added to the safety of the arterial suture by allowing the surgeon to reenforce the first suture line.

5. That the end-to-end union of the vein was apparently followed by immediate, complete, and permanent restitution of the blood current.

6. That iodized catgut sutures and intestinal needles were used for the vein and the artery.

Dr. G. G. Davis said that this case was somewhat similar to one which came under his notice not long ago. The patient was a child 7 years of age, who, when about 3 years old was being circumcised. From some movement of the child the knife, which was lying on the abdomen, penetrated the thigh and wounded the femoral artery; a surgeon was called in and he ligated the femoral artery. About four years passed when the case came under his notice; it illustrates very clearly the effect of this condition on the growth of the limb. The size of the limb was very distinctly increased. The evidences of arteriovenous connection were very apparent; one could get the thrill and murmur and could see the pulsation approximately at the apex of Scarpa's triangle. The child is active, running about, but has a marked disproportion between the limbs, the injured one being three-quarters inch longer than the other, and one inch greater in circumference, showing the influence of this condition upon the nutrition. One would expect that the nutrition of a part was best carried on by the normal arrangement, but according to this case it would hardly seem so.

Dr. John B. Roberts said that it had long seemed to him that the nomenclature of this condition was bad. We say arteriovenous aneurisms or aneurismal varix and varicose aneurism. Years ago he suggested that it would be much better if they were called arteriovenous fistulæ. Simple arteriovenous fistula and sacculated arteriovenous fistula were the names which he then suggested. There is a similarity to aneurism, but that term should be restricted to a tumor made up of coats of an artery.

STATED MEETING, HELD FEBRUARY 5, 1912

The President Dr. Gwilym G. Davis, in the Chair.

ARTHROTOMY FOR ELBOW LUXATION.

Dr. Edward B. Hodge exhibited a patient to show the result one year after arthrotomy for postero-external luxation of the elbow.

Male, 49 years of age, switchman, had his right arm amputated at the wrist following a crush 14 years ago. Six weeks before his admission to the Presbyterian Hospital, March 8, 1911, he fell from a freight car upon his left arm, injuring the elbow. There was swelling and disability. As the swelling lessened, he became able to use the arm, except bending the elbow. When admitted to hospital, the left elbow showed nearly full extension, flexion limited to 160 degrees. The olecranon was out of line with the condyles and to the outer side as well as posterior. The head of the radius rotated behind and below the external condyle. The X-ray confirmed the clinical diagnosis of postero-external luxation. It also showed several loose pieces of bone, chiefly in the region of the external condyle.

On March 10, under ether, several attempts at reduction failed. An external incision was then made, extending from above the external condyle down on the forearm. The muscles were separated from the region of the external condyle, and on retraction toward the median line a good exposure was obtained. The head of the radius, well posterior and behind the external condyle, showed a crack extending one inch down the shaft. A loose piece from the external condyle was removed. After much difficulty the bones were replaced, using the handle of an instrument as a lever. Muscles and ligaments were held in as nearly normal position as possible by chromic gut sutures. A cigarette drain was placed to the capsule, the skin closed with silkworm gut, and the arm dressed in acute flexion.

Convalescence was uneventful except for some numbness and tingling in the ulnar distribution. This is still present in