Anatomy and surgical technique of groin dissection

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To the residents and staff
of the Ellis Fischel State Cancer Hospital

Foreword

The interpretation of clinical data is not a task to be taken lightly. In contrast to the well-planned laboratory experiment, such data are apt to represent a series of small, poorly planned, and uncoordinated experiments conducted by several different persons over a long period of time. The interpreter must be on constant guard against many sources of bias, some of them cleverly concealed. Some of these lie within the data, others are in his own preconceived notions as to the manner in which malignant tumors behave.

To illustrate these points, let us assume that the interpreter has collected a large volume of clinical data dealing with the employment of groin dissection in the clinical management of malignant disease. There are three categories of statements that he will commonly make on the basis of such data:

1. Statements of fact. The initial treatment in 80 clinical stage I cases was surgical resection of the primary tumor. In 30 cases there was local recurrence at or near the primary site within 5 years. In the remaining 50 cases clinically manifest lymph node metastases appeared within 5 years in 25 instances.
2. Simple generalizations. In clinical stage I cases treated initially by surgical resection of the primary tumor, local recurrence may be expected within 5 years in 37.5 percent. In those without local recurrence late development of lymph node metastases may be expected in 50 percent.
3. Broad generalizations. In clinical stage I cases treated by surgical resection, control of the primary tumor will be achieved in 37.5

percent. In the remainder, occult metastases will be present in the regional lymph nodes in 50 percent.

Statements of the first category require no explanation. They simply express the actual observations in summary form. Statements of the second category contain the implicit assumption that the group of cases in which surgical resection was employed are representative of clinical stage I cases. If perchance the surgeon selected only the more favorable cases—small tumor, indolent clinical growth, good risk patient—then the generalization is inaccurate and should be changed to read: "In the more favorable clinical stage I cases . . . ."

Statements of the third category are even more difficult because they contain not only the implicit assumption of representative case material but also certain terms that require definition. In the example cited the terms are "control of the primary tumor" and "occult metastases." If the interpreter uses simple operational definitions such as "local recurrence at or near the primary site" and "late development of lymph node metastases" then he has merely reworded the second statement. Unfortunately these terms have connotations that go beyond the operational definitions.

Every clinician has certain preconceived notions as to how malignant tumors grow and spread. One of the more deeply ingrained notions is that if a single malignant cell is left behind either at the primary site or in a node, it will continue to grow and reproduce and spread to other sites. Given such a notion, the term "control of the primary tumor" evokes the picture of a wide sweep that takes in all the meandering cancer cells at the periphery of the clinically obvious lesion. If one cell happens to have ventured outside these wide limits then local recurrence or a metastasis will eventually appear. Such a notion commits one to the principle that progress in cancer surgery lies only in the direction of an ever-widening sweep.

Another point of view of the behavior of malignant tumors considers that the meanderings of individual cells always take them well beyond the limits of any sweep however wide, even before the primary tumor is clinically manifest. The majority of these cells succumb or revert to an innocuous state in the face of an adverse environment. The purpose of surgical resection is to deprive the tumor of those sites in which the environment is known to be relatively favorable and in which the wandering cells are frequently successful in colonizing. The remainder of the task of control is left to the adverse environment (or host resistance, if you prefer). This happens to be the point of view of the writer.

It requires that the surgical attack be evaluated in terms not only of the potential benefit of reducing the total environment but also of the potential harm of transforming an adverse into a favorable one for the remaining tumor cells.

The authors of this book have done a fine job of avoiding the pitfalls of biased case selections, implicit assumptions, and ambiguous terms. It was a particular pleasure to find that they recognize that there is more than one plausible explanation for the presently known facts regarding the mode of spread of malignant tumors. Both the hard-pressed clinician seeking empirical rules for managing cases and the oncologist relaxed in an armchair and seeking an opportunity to test his preconceived notions will find something of value in this book.

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Preface

The Missouri legislation of 1937 for the establishment of a state cancer hospital charged the staff to conduct "such scientific research as will promote the welfare of indigent patients committed to its care." However, the Missouri legislature has yet to appropriate funds for "scientific research" in the sense that this is synonymous with "laboratory research." Rather, the Ellis Fischel State Cancer Hospital has always been overwhelmed with service obligations and its staff has recorded from time to time observations on the therapy and behavior of cancer. The hospital has been privileged to have on its staff observant physicians and residents who have recorded carefully their observations.

The people of rural Missouri, whom the hospital has served, are not an unstable lot. Their stability, coupled with the unrelenting persistence of the social service department, directed by Mrs. Miriam G. Hoag, has created a growing reservoir of case histories on cancer for which a complete follow-up to the terminus of life is being recorded. The physician is prone to lose sight of the fact that the transient intervention of intense care is only a brief chapter in the biologic continuum that makes a human life.

The care of the sick by the application of contemporary therapeutic modalities constitutes the rendering of "treatment" or "service." However, the accumulation and analysis of the observations referable to this service and the influence of the service upon the patient we would like to dignify by calling "scientific research."

First, what is a science? Any science has two basic components: careful observation and quantitation followed by analytic consideration of the data in order to draw proper conclusions. In the scientific method the scientist must show that a sequence of events is causally related and that the sequence is not a by-product of random chance association. Similarly, the science of the bedside evolves. Physicians record their observations and in time, even for the less frequent problems and diseases, sufficient observations accumulate so as to permit an analytic consideration of the data. The science of the bedside is an applied science and has a specific goal—to reduce the morbidity and mortality of disease and to preserve the "joy of living," not just life itself. The addition of several years to a human life, if these years be miserable ones, only serves the ego of the therapist and not the patient. Thus, in analyzing clinical data, the analyst is charged to show that the characteristics of the diseases and the sequences of therapy were associated with a reduction in the morbidity and mortality associated with the affliction. All such conclusions require controls, the control being the natural history of the untreated illness or the history of the illness treated by some alternate method.

Ideally, all clinical studies should be randomized; however, in the lifetime of an individual physician this is rarely possible, particularly for less frequent illnesses. Cooperative studies can bring larger numbers of problems to analysis in a shorter time. However, cooperative studies on chronic diseases, such as cancer, still require many years of observation before final conclusions become possible. The analysis of existing records of the history of chronic diseases furnishes the answers to many questions and guidelines to future routes of inquiry. Changing physicians and their ideas, the diversity of clinical and pathologic variables, and treatment as well as nontreatment permit the classification of groups of cases. These groups as they become large in number give insight into the natural history of the disease and the comparative efficacy of therapy.

In this monograph our working hypothesis is that en bloc ilioinguinal lymph node dissection is a useful operation in reducing the morbidity and mortality among people having cancers that metastasize to these nodes. Our goal is to consider the morbidity factors associated with this operation and to identify those factors that minimize the morbidity. Second, we must show if, when, and how the operation alters the natural progression and lethality of the cancers. Third, we must define the anatomic extent of the lymph nodes and the surgical technique requisite for their safe and complete removal. None of the cancers that metastasize to the groin occurs with great frequency. In 25 years enough cases have accumulated in various categories to permit some significant conclusions. Insufficient data are available in other areas and some unanswered questions are delineated. The problems of cancer metastatic to lymph nodes of the groin are common to many anatomic surgical specialties. We believe that the subdivision of management of this infrequent problem according to anatomic site of cancer origin makes the accumulation of a large experience with groin metastases difficult to obtain. For this reason, we believe that a collective consideration of a cancer problem common to many anatomic specialties is worthwhile.

To achieve these goals we must rely for a large part on the bedside observations of the chief surgeons at the Ellis Fischel State Cancer Hospital who preceded us: Drs. Eugene M. Bricker, Everett D. Sugarbaker, John J. Modlin, Henry Schwarz, II, Ned D. Rodes, and Elmer J. Schewe, Jr. For the pathologic records and interpretations we are indebted to Drs. M. Pinson Neal, Lauren V. Ackerman, Richard E. Johnson, Theodore vanRavenswaay, and Carlos Perez-Mesa. These men and their residents provided for the continued accumulation of good clinical records. Through their records they have been our associates and our teachers in undertaking this book. Along with them we are indebted to the resident physicians, hospital personnel, and patients of the Ellis Fischel State Cancer Hospital.

The anatomic drawings were done by Miss Ramona Morgan of the University of Missouri and the graphic illustrations by Miss Marilyn Harris of the Washington University Department of Medical Illustration. We would like to thank Miss Helen Almquist, Mrs. Annette McCoy, and Mrs. Freda Tarr for clerical assistance.

Lastly, the teachings, assistance, and support that the professors of surgery of Washington University School of Medicine have given to the professional staff and residents of the Ellis Fischel State Cancer Hospital must be acknowledged. Dr. Evarts Graham was instrumental in imbuing a small rural state hospital for the indigent with the proper spirit of scientific philosophy in clinical medicine. Dr. Carl A. Moyer has continued and added to that tradition.

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Chapter 1

Anatomy of the ilioinguinal region

The object of an ilioinguinal (groin) lymph node dissection is to remove the lymph nodes and lymph channels of the ilioinguinal region in toto. Obviously, the anatomical features of this region not only determine the technique and the extent of the operative procedure but also influence the indications for its performance.

The following review of the anatomy of the ilioinguinal region is not intended as an exhaustive reference such as is found in the standard anatomical texts (Gray). Rather it is intended to point out certain anatomical features of the region that influence or determine the applicability of the operation, and to serve as an aid and as a guide in the operative procedure.

General

Ilioinguinal lymph node dissection encompasses the removal of all of the lymph node-bearing tissues from the bifurcation of the common iliac artery (into internal and external iliac artery) to the passage of the femoral artery beneath the sartorius muscle near the apex of the femoral triangle. Thus, the areolar adipose lymph node-bearing tissues from the retroperitoneal region along the external iliac artery and from the region of the femoral triangle are removed.

Certain landmarks are helpful in outlining the region involved in this operation. In the thigh, the femoral triangle (trigone of Scarpa) is an ex-

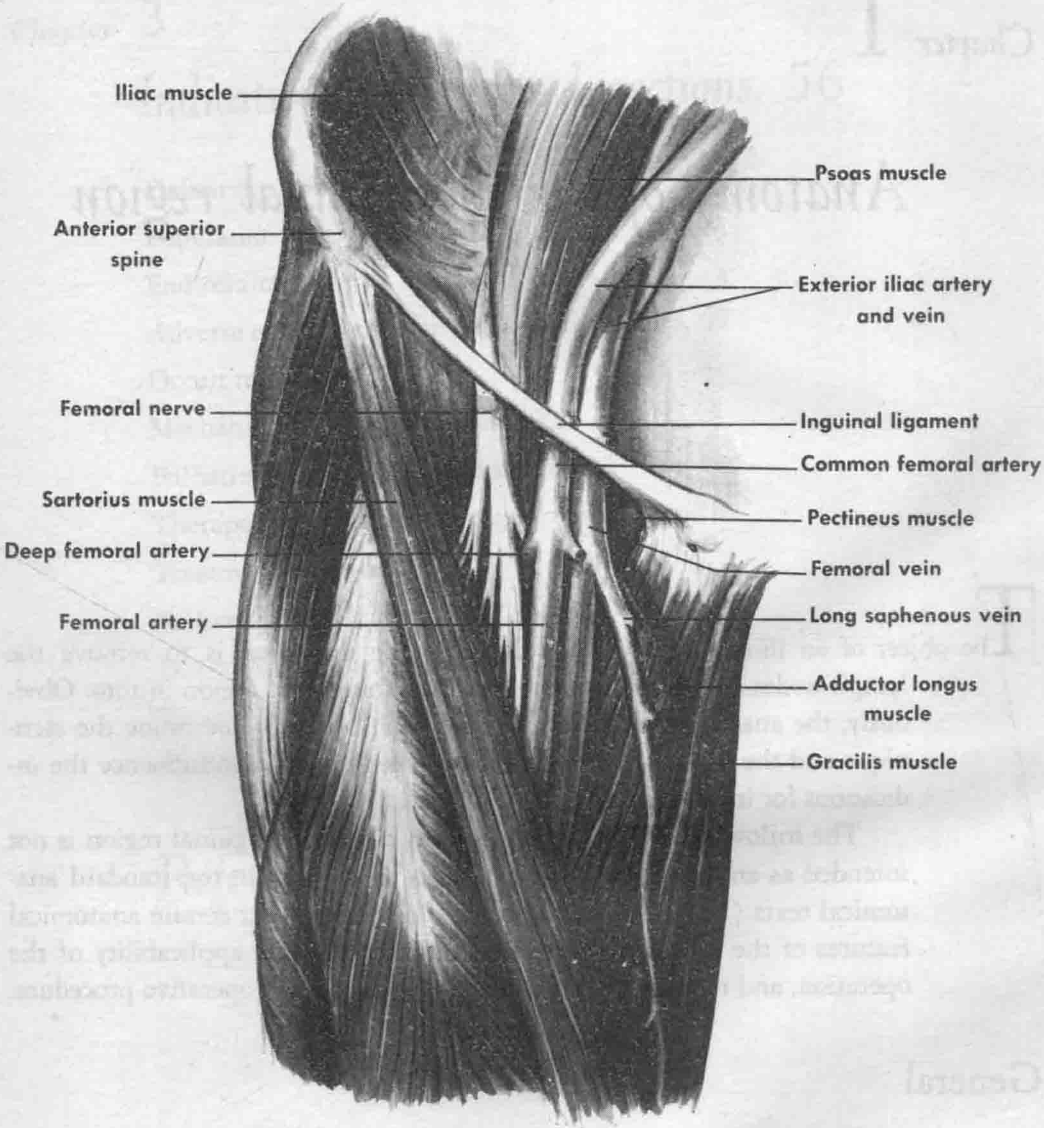

Fig. 1. Anatomical relations of the contents of the femoral triangle to the iliac blood vessels.

tremely significant anatomical unit (Fig. 1). The inguinal ligament, which runs from the readily palpable anterior superior iliac spine to the pubic tubercle, lies superior to the inguinal skin crease. The inguinal ligament (and not the lower skin crease of the groin) forms the upper border or base of the femoral triangle. The sartorius muscle passes obliquely downward and inward from the anterior superior iliac spine to the medial side of the knee and forms the lateral border of the femoral triangle. The medial border of the femoral triangle is formed by the medial edge of the adductor longus muscle. Its tendon, inserting on the pubic tubercle, is easily palpated when the thigh is adducted against resistance. Significant lymph nodes are seldom found at the medial border of the adductor longus muscle, and dissection is usually not carried this far medially (Daseler, Anson, and Reimann). The floor of the femoral triangle is formed by the fascia overlying the iliopsoas muscle laterally and the adductor longus and pectineus muscles medially. The roof of the femoral triangle is formed by the fascia lata. Thus, the subcutaneous tissue overlying the femoral triangle, being superficial to the fascia lata, is not truly within the femoral triangle. However, the greatest number of inguinal nodes are found in the subcutaneous tissue (the superficial inguinal nodes), and they are frequently called femoral triangle nodes.

The inguinal ligament, in passing from the anterior superior iliac

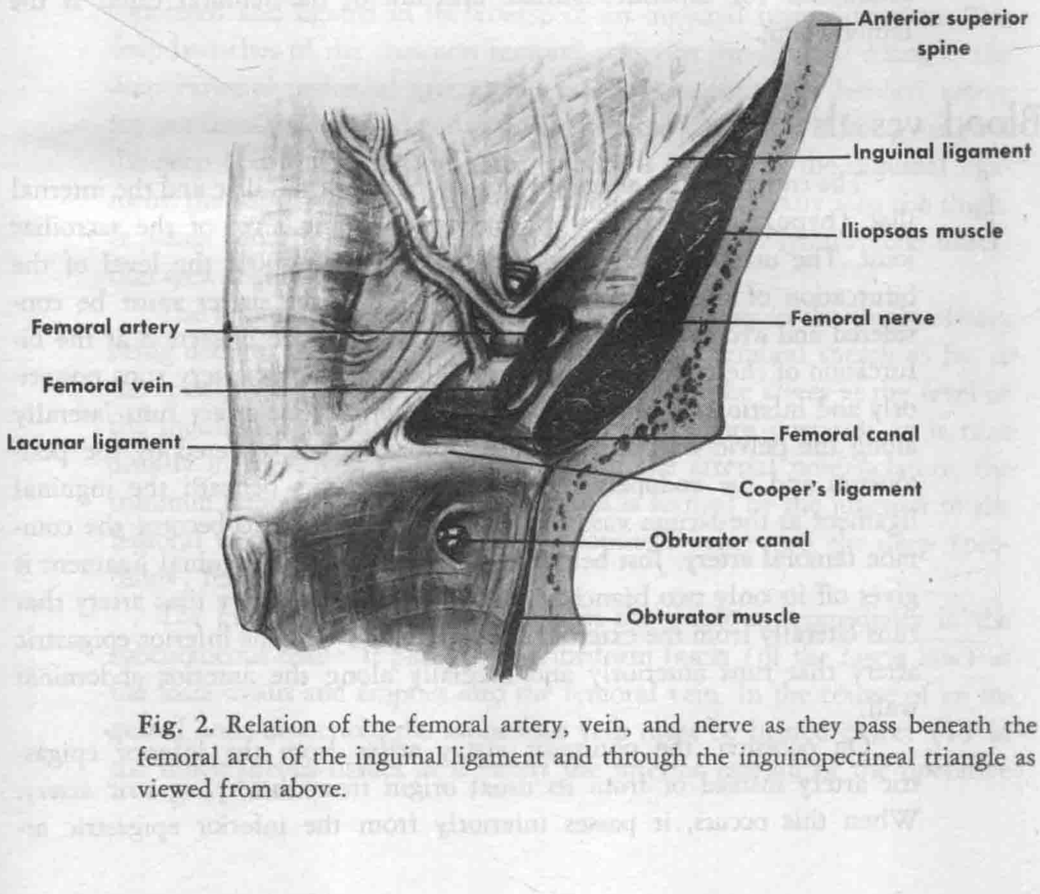

Fig. 2. Relation of the femoral artery, vein, and nerve as they pass beneath the femoral arch of the inguinal ligament and through the inguinopectineal triangle as viewed from above.

spine to the pubic tubercle, arches over the iliopectineal line (Uhlenhuth) and thus forms an important space, the femoral arch (Fig. 2). A band of iliac fascia runs from the inguinal ligament to the iliopectineal eminence and forms the iliopectineal ligament. It divides this femoral arch into two spaces. The lateral space (lacuna musculorum) is occupied by the iliopsoas muscle and the femoral nerve. The medial space (lacuna vasorum) contains the femoral vessels (the artery is lateral and the vein is medial) and the femoral canal. The femoral sheath is the continuation of the iliac fascia and the transversalis fascia into the thigh, surrounding the femoral artery, vein, and canal as they pass through the lacuna vasorum. The gap between the femoral vein and the lacunar (Gimbernat's) ligament is occupied by the femoral canal. The femoral canal is a narrow space lying most medial in the femoral arch and contained within the femoral sheath. It can be considered as the lymphatic compartment of the femoral arch and usually contains one or two deep inguinal nodes in addition to several lymphatic channels in its areolar-adipose contents. The abdominal (or superior) slitlike aperture of the femoral canal is the femoral ring.

Blood vessels

The common iliac artery divides into the external iliac and the internal iliac (hypogastric) arteries approximately at the level of the sacroiliac joint. The ureter usually crosses the iliac vessels about the level of the bifurcation of the common iliac artery. Thus, the ureter must be considered and avoided at the "high point" of the node dissection at the bifurcation of the common iliac artery. The hypogastric artery runs posteriorly and inferiorly into the pelvis. The external iliac artery runs laterally along the pelvic wall against the iliopsoas muscle, covered by the peritoneum and the endopelvic fascia, until it passes beneath the inguinal ligament at the lacuna vasorum of the femoral arch to become the common femoral artery. Just before it passes beneath the inguinal ligament it gives off its only two branches: (1) the deep circumflex iliac artery that runs laterally from the external iliac artery and (2) the inferior epigastric artery that runs anteriorly and medially along the anterior abdominal wall.

On occasion, the obturator artery arises from the inferior epigastric artery instead of from its usual origin from the hypogastric artery. When this occurs, it passes inferiorly from the inferior epigastric artery and may come into the course and be identified during a groin dissection.

The external iliac vein extends from the inguinal ligament (as a continuation of the common femoral vein) medial and posterior to the external iliac artery until it joins the internal iliac (hypogastric) vein to form the common iliac vein. It receives the deep circumflex iliac vein and the inferior epigastric vein, which accompany their arterial counterparts.

The common femoral artery enters the thigh beneath the inguinal ligament about halfway between the anterior superior iliac spine and the pubic tubercle, encased in the femoral sheath. Its pulsation is palpable, making its position easy to identify. It passes distally into the thigh, always lying beneath the fascia lata. The femoral artery gives off three superficial branches that pierce the fascia lata shortly after it emerges from beneath the inguinal ligament. These are the following: (1) the superficial circumflex iliac artery (originating laterally), (2) the superficial epigastric artery (originating medially), and (3) the superficial external pudendal artery (originating medially). These branches are encountered and ligated in the course of an inguinal node dissection. The deep branches of the common femoral artery in the femoral triangle, the deep external pudendal artery, and the deep (profunda) femoral artery are not usually identified per se during a groin dissection. After giving off the deep (profunda) femoral artery about 4 cm. below the inguinal ligament, the superficial femoral artery then continues distally into the thigh. It passes beneath the sartorius muscle and out of the lymph node dissection area near the apex of the femoral triangle.

The femoral vein accompanies the femoral artery in the thigh, always being deep to the fascia lata and encased by the femoral sheath as far as the apex of the femoral triangle. It lies medial to the artery at the level of the inguinal ligament but gradually becomes more posterior as it runs distally in the thigh. Corresponding with the arterial nomenclature, the common femoral vein in the upper thigh is formed by the junction of the femoral vein (a continuation of the popliteal vein) and the deep (profunda) femoral vein.

The greater saphenous vein runs in the thigh anteromedially in the subcutaneous tissue. It pierces the cribriform fascia (of the fascia lata) at the fossa ovalis and empties into the femoral vein. In the course of an inguinal node dissection, the saphenous vein must be ligated twice: (1) in the subcutaneous tissues as it enters the inferior margin of the operative