

Course Syllabi

**USUHS - SCHOOL OF MEDICINE
FIRST YEAR TOPIC SCHEDULE
ACADEMIC YEAR 2009-2010**

WEEK: 31

		Mon 12 Apr		Tue 13Apr		Wed 14 Apr		Thur 15 Apr		Fri 16 Apr	
0730 to 0820		HUMAN CONTEXT 0730 - 0850 Alcohol: The Solvent That Doesn't Solve		DEAN'S TIME		STRUC & FUNC ORGAN SYS Cerebral Circulation		DEAN'S TIME Simulator session 14 NCA 0700 Simulator session 15 USUHS 0730		STRUC & FUNC ORGAN SYS Hypertension	
0830 to 0920		SMALL GROUP (CO) HUMAN CONTEXT 0900-1020 Adam's Rib: A Bone of Contention in Medicine		DEAN'S TIME		O'NEILL (LE) STRUC & FUNC ORGAN SYS Pulmonary Circulation		STRUC & FUNC ORGAN SYS Exercise		VILLINES (LE) STRUC & FUNC ORGAN SYS Lab Discussion	
0930 to 1020		PANEL (LE)		DEAN'S TIME		DOBSON (LE) STRUC & FUNC ORGAN SYS Fetal/Neonatal Transition		SCHWARTZ (LE) MED PSYCH Sleep and Sleep Disorders		O'NEILL (LE) MILITARY STUDIES I Circadian Dysrhythmia	
1030 to 1120		STRUC & FUNC ORGAN SYS Local Control of Blood Flow		STRUC & FUNC ORGAN SYS 1100-1600 Blood pressure lab #6		SCHMORHUN (LE) MILITARY STUDIES I Foot Care and Prosthetics		PASTEL (LE) MED PSYCH Stress: Perception, Mechanisms, and Effects		STEELE (LE) MEDICAL HISTORY 20th Century Practitioners & Specializations	
		O'NEILL (LE)				RINK (LE)		SPIEKER (LE)		SMITH (LE)	
1300 to 1350		STRUC & FUNC ORGAN SYS Coronary Circulation				ICM II Groups 1-21 Musculoskeletal/Joint Exam		EPID & BIOSTATS Introduction to Statistical Inference		EPID & BIOSTATS Comparing Means and Proportions	
1400 to 1450		GOLDSTEIN (LE) STRUC & FUNC ORGAN SYS Issues in Animal Physiology (required attendance)						OLSEN (LE) EPID & BIOSTATS Introduction to Statistical Inference		OLSEN (LE) EPID & BIOSTATS Comparing Means and Proportions	
1500 to 1550		O'NEILL (LA) Lec Rm E DEAN'S TIME		(LA)		Assigned Preceptor Group MDL/Conf Rms/SIMCEN (LA)		OLSEN (LE) DEAN'S TIME		OLSEN (LE) DEAN'S TIME	

Structure & Function

STRUCTURE AND FUNCTION OF ORGAN SYSTEMS—2010

Blood/Lymphoid System

1) Introduction: Cells and Tissues	Johnson	March 29
2) Blood: Blood and Innate Host Defenses	Rothwell	March 29
Lab #1: Blood	Staff	March 29 (LA-1½ hrs)
3) Blood: Stem Cell Physiology	Rothwell	March 30
4) Blood: RBCs/Hematopoiesis	Rothwell	March 30
Lab #2: Hematopoiesis	Staff	March 30 (LA-2 hrs)
5) Blood: Hemostasis	Rothwell	March 30
6) Immune: Organs of the Immune System I	Rothwell	March 31
7) Immune: Organs of the Immune System II	Rothwell	March 31
Lab #3: Lymphoid Organs	Staff	March 31
8) Immune: Immunology small groups (2 sessions)	Staff	April 2
Exam 1 Blood/Lymphoid/Immune System 0800 (We will begin seating at 0750)	STAFF	April 5

Cardiovascular System

9) CV: Circulatory System Introduction	Rothwell	April 5
10) CV: Properties of the Cardiovascular System	O'Neill	April 5
11) CV: Electrophysiology	Bryant	April 6
12) CV: Heart Mechanics	Haigney	April 6
Lab #4: Circulatory System	Staff	April 6 (LA-2 hrs)
13) CV: Basic Properties of the EKG	Flagg	April 7
14) CV: Cardiac Cycle	Atwood	April 7
15) CV: Hemodynamics	O'Neill	April 7
16) CV: Regulation of Cardiac Function	Schwartz	April 8
17) CV: Microcirculation	O'Neill	April 8
18) CV: Venous System	O'Neill	April 8
19) CV: Arrhythmias	Haigney	April 9
Lab #5: EKG	Staff	April 9 (LA-2 hrs)
20) CV: Reflex Control of Blood Pressure I	O'Neill	April 9
21) CV: Reflex Control of Blood Pressure II	O'Neill	April 9
22) CV: Local Control of Blood Flow	O'Neill	April 12
23) CV: Coronary Circulation	Goldstein	April 12
24) CV: Lab preface: Issues in Animal Physiology (Mandatory)	O'Neill	April 12
Lab #6: Blood Pressure and Cardiac Function	Staff	April 13 (LA-5 hrs)
25) CV: Cerebral Circulation	O'Neill	April 14
26) CV: Pulmonary Circulation	Dobson	April 14
27) CV: Fetal/Neonatal Transition	Shmorhun	April 14
28) CV: Exercise	Schwartz	April 15
29) CV: Hypertension	Villines	April 16
30) CV: Lab discussion	O'Neill	April 16
Exam 2 Cardiovascular System 0800	STAFF	April 19

Respiratory System

31) Resp: Respiratory System Intro and Structure I	Rothwell	April 20
32) Resp: Respiratory System Intro and Structure II	Rothwell	April 20
33) Resp: Cellular Basis for Respiratory Disorders Lab #7: Respiratory	Rothwell Staff	April 20 April 20 (LA-1.5 hrs)
34) Resp: Mechanics I	Rothwell	April 21
35) Resp: Mechanics II	Rothwell	April 21
36) Resp: Regulation	Rothwell	April 21
37) Resp: Diffusion and Transport of Oxygen	Dalgard	April 22
38) Resp: Diffusion and Transport of Carbon Dioxide	Namboodiri	April 22
39) Resp: Exercise, High Altitude and Deep-Sea	Wilson	April 23
40) Resp: Respiratory Insufficiency and Hypoxemia	Mahon	April 23
41) Resp: Ventilation/Perfusion and Shunt	Argyros	April 26

Renal System

42) Renal: Urinary System Intro I	Johnson	April 26
43) Renal: Urinary System Intro II	Johnson	April 27
44) Renal: Body Fluids and their Alteration Lab #8: Urinary System	Dobbins Staff	April 28 April 28
45) Renal: Major Urinary Solutes	Dobbins	April 30
46) Renal: Clearance and Glomerular Filtration	Dobbins	April 30
47) Renal: Control and Composition of Fluid Volumes I	Dobbins	April 30
48) Renal: Control and Composition of Fluid Volumes II:	Dobbins	May 3
49) Renal: Urinary Concentration and Acid/base Basics	Dobbins	May 3
50) Renal: Acid/Base Balance	Dobbins	May 5
51) Renal: Kidney Disease	Pasiuk	May 5
52) Renal: Acid/base clinical correlation	Marks	May 5
53) Renal: Renal pathophysiology small groups (2 sessions)	Staff	May 6

Exam 3 – Renal and Respiratory Systems 1000 STAFF May 7

Gastrointestinal System

54) GI: Intro/Oral Cavity/Salivary secretion I	Rothwell	May 11
55) GI: Oral Cavity/Salivary secretion II Lab #9: Oral Cavity/Esophagus	Rothwell Staff	May 11 May 12 (LA-2 hrs)
56) GI: Swallowing/Esophageal Motility	Dubois	May 14
57) GI: Speech and swallowing: clinical correlation	Newman	May 14
58) GI: Gastric Structure and Acid Secretion	Dubois	May 14
59) GI: Intestines and absorption I	Agoston	May 17
60) GI: Intestines Lab #10: Stomach and Intestines	Agoston Staff	May 17 May 17 (LA-2 hrs)
61) GI: Motility I	Johnson	May 19
62) GI: Motility II	Johnson	May 19
63) GI: Pancreas and pancreatic secretion	Rothwell	May 20
64) GI: Celiac disease	Lamphear	May 20
65) GI: Liver and hepatobiliary secretion Lab #11: Accessory Organs	Rothwell Staff	May 20 May 20 (LA-2 hrs)
66) GI: Issues in nutrition	Rothwell	May 21 (LE-2 hrs)

Exam 4 Gastrointestinal System 0800**STAFF****May 26**

67) Endo: Introduction to Endocrinology	Mueller	May 26
68) Endo: Pituitary/Pineal	Rothwell	May 26
Lab #12: Pituitary/pineal	Staff	May 27 (LA-1 hr)
69) Endo: Role of ADH	Mueller	May 27
70) Endo: Disorders of ADH Secretion	Mueller	May 28
71) Endo: ACTH and Glucocorticoids	Mueller	May 28
72) Endo: Adrenal/Aldosterone and catecholamines	Mueller	May 31
73) Endo: Thyroid/Parathyroid/calcium regulation	Borst	May 31
Lab #13: Thyroid/Para/Adrenal	Staff	May 31 (LA 2 hrs)
74) Endo: TRH, TSH, and Thyroid Hormone	Burman	June 1
75) Endo: Hypo- and Hyperthyroidism	Wartofsky	June 1
76) Endo: Endocrine Pancreas I	Mueller	June 2
77) Endo: Endocrine Pancreas II	Mueller	June 2
78) Endo: Diabetic Ketoacidosis	Bauer	June 3
79) Endo: The Diabetic Patient	Bauer	June 3
Lab #14: Blood Glucose/Glycated Hemoglobin	Staff	June 4 (LA 3 hrs)
80) Endo: Meiosis	Fries	June 7
81) Endo: Embryology, Sexual Differentiation	Mueller	June 7
82) Endo: Female Reproduction I	Borst	June 7
83) Endo: Female Reproduction II	Johnson	June 7
84) Endo: Adult Female Reproductive Endocrinology	Mueller	June 8
85) Endo: Disorders of Sexual Differentiation	Poth	June 8
Lab #15: Female Reproduction	Staff	June 8
86) Endo: Pregnancy, Parturition and Contraception	Mueller	June 8
87) Endo: Male Reproduction I	Agoston	June 9
88) Endo: Male Reproduction II	Johnson	June 9
Lab #16: Male Reproduction	Staff	June 9
89) Endo: Male Reproductive Endocrinology	Mueller	June 10
90) Endo: Infertility	Catherino	June 10
91) Endo: Hormone Regulation of Calcium	Mueller	June 11
Lab #17: Review Histology	Staff	June 11

Exam 5 Endocrine System 0800**STAFF****June 15, 2010****Practical Exam****0830****STAFF****June 16, 2010**

LABORATORY SCHEDULE

1) Blood	March 29
2) Hematopoiesis	March 30
3) Lymphoid Organs	March 31
4) Circulatory System	April 6
5) EKG Laboratory	April 9
6) Blood Pressure and Cardiac Function	April 13
7) Respiratory System	April 20
8) Kidney, Ureter and Bladder	April 28
9) Oral Cavity and Esophagus	May 12
10) Stomach and Intestines	May 17
11) Accessory Organs	May 20
12) Pituitary/Pineal	May 27
13) Thyroid/Parathyroid/Adrenal	May 31
14) Blood Glucose and Glycosylated Hemoglobin	June 4
15) Female Reproduction	June 8
16) Male Reproduction	June 9
17) Review	June 11

Parasitology Course

In years past, the course has had some live parasite materials that the medical students have been able to examine during the laboratory portion of this class. Blood was taken from a gerbil infected with *Brugia pahangi* available in lab so that the students could see live microfilariae in a blood smear. However, the Diagnostic Parasitology and Medical Zoology course has undergone a ~50% reduction in hours from last year. Due to the reduction in lab time, we did not use any animal materials this year to look at microfilariae, so there is use of gerbils or any other animals.

no

RRL



MS - III
SURGERY HANDBOOK

2009-2010



MS III
Summer Clerkship

Dear Students,

Congratulations on making it to this point in your medical student career! We are excited to see you come on board as you begin your MSIII surgery clerkship. We as members of the teaching faculty realize that only a few of you will eventually choose to go into some branch of surgery. However, we are certain that as members of the military, all of you will find yourself applying surgical principles or needing to be educated consumers of surgical resources. We encourage you to be alert and attentive, and work hard to assimilate as much knowledge as possible during the next few weeks of your initial surgical experience. For those of you who are considering a career in surgery, obviously this rotation is a key to your successful future. A few things to keep in mind to help you succeed in surgery.

- **You need to be on time.** You need to be in attendance at rounds, at conferences, at clinics, etc. There is no “you do not have to attend lectures” rule now. You always have to be where you are expected to be. No exceptions.
- **You need to constantly be learning.** You need to do this while on your feet, while moving down the hallway, while in conferences, whatever.
- **You need to jump in and get involved.** Take as much responsibility as your residents and attending surgeons will permit you to have. Take “ownership” of your patients. Learn from every patient. Read about every disease you see, and about every operation. Be prepared to be able to recite the pertinent details of each patient’s case. Avoid the impulse to hang back and just be a student observer.
- **Get to know your On-Site Clerkship Directors.** We have three excellent, experienced surgeons who are in charge of the rotation at your hospital. At NNMCMC, we have Dr. (Captain) Bill Liston. At WRAMC, we have Dr. (retired Colonel) A.J. Copeland. And at BAMC, we have Dr. (retired Colonel) Dan Rosenthal. If you have any difficulties whatsoever, your first point of contact is your on-site director.
- **Identify your “rating officials” early in each rotation.** Make certain that this person knows you and is aware of your good work. In many cases, this will be a resident on your assigned service. Much of your grade is determined by the ratings of these various leaders. Occasionally, students are upset at the ratings they receive. Obviously, we who issue the grades cannot be responsible for the ratings that you earn. Ultimately, you are responsible, and you can influence this process by finding out early in the rotation what is expected of you, and then meticulously meeting those expectations.

Again, we wish you all the very best as you learn of the fine art and science of surgery. We are anxious for you to succeed, and to come away from these rotations with valuable experience and knowledge, which will help you on into the future, wherever you might go, and whatever you might do.

Sincerely,



E. Matthew Ritter, MD, FACS
Major, USAF, MC
Chief, Academic Surgery
Norman M. Rich Department of Surgery
301-295-9826, eritter@usuhs.mil

Academic Year 2009-2010

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NORMAN M. RICH DEPARTMENT OF SURGERY MS3 SURGICAL CLERKSHIP INFORMATION

INTRODUCTION

The MS3 Clerkship in the Department of Surgery consists of a single institution twelve-week block, which includes four weeks of general surgery, and three two-week blocks of selected specialties. Two weeks of Anesthesia, provided by the Department of Anesthesia are enfolded into the clerkship. The general surgery rotations will be at Brooke Army Medical Center (BAMC), Walter Reed Army Medical Center (WRAMC), and National Naval Medical Center (NNMC). The surgical specialty rotations will be selected by each student and take place at BAMC, WRAMC, and NNMC. The first two days will be spent with USUHS staff completing the Introduction to Surgery course (page 8). This will include a series of introductory workshops, use of various modalities at the simulation center and a hands on surgical experience in the animal lab at USUHS, performing surgery on live subjects.

The third year surgical clerkship exists as a multi-disciplinary clinical experience, which is designed to introduce the medical student to the basic concepts of surgical practice and perioperative patient care. Rotations on general surgery, as well as the specialties, will provide the student with outpatient clinical experiences as well as in-patient care and operative knowledge and understanding.

Students will be assigned to specific surgical teams under the responsibility and guidance of the on site clerkship director and clinical coordinator and will work closely with the resident team and the staff surgeons. National Capital Area (NCA) students will also participate in the Thursday academic afternoon sessions at USUHS where they will be assigned to mandatory preceptor groups that meet frequently with a surgical faculty member. The afternoon also includes a talk by a visiting distinguished lecturer. Details on these required educational sessions can be found in your Welcome Packet. Reminders will be emailed to students by the student coordinator, Ms. Suzanne McCoy, Dept. of Surgery, (Email: smccoy@usuhs.mil) 3rd floor, Bld.A (301-295-5866). The listing of all the lectures is also posted on the Surgery website, as well as the bulletin board located in the hallway, at the Department of Surgery main office, Room A3014.

CLERKSHIP STRUCTURE

The Surgery Clerkship will include the following rotations:

1. Four weeks of **GENERAL SURGERY**
2. Two weeks in a **REQUIRED PRIME** specialty (Cardiothoracic, Plastic/Burn, Vascular and Orthopedics).
3. Choice of two **SELECTED** specialties (two weeks on each specialty) from any of the following specialties:
 - a) Cardiothoracic Surgery
 - b) ENT
 - c) Neurosurgery
 - d) Ophthalmology
 - e) Orthopedics
 - f) Plastic Surgery
 - g) Transplant (WRAMC only)
 - h) Urology
 - i) Vascular Surgery
 - j) Burn Service (BAMC only)

4. Two weeks of Anesthesia (Anesthesia is a separate Department and will provide a separate grade).

Students may choose the same prime specialty and selected specialty, thereby spending 4 weeks in that rotation. Be aware that as not all specialties are offered at all sites, students may select from those specialties offered at their sites.

ROTATION GOALS

The goals of the surgical rotation are to acquaint the student with the entire surgical experience. This includes membership on the "surgical team" with full participation in all activities of the team. These will include patient evaluation, treatment planning, discussions concerning decision-making, preoperative evaluation, operative experience, post-operative care, surgical rounds and surgical conferences. Students will have night call responsibilities on a schedule planned by the on site clerkship director. In addition, students should read the provided Lawrence surgical text. Students should also be aware of the available surgical journals and other information sources.

COUNSELING AND FEEDBACK

Students are strongly urged to discuss their progress and receive feedback on all aspects of the rotation with the senior members of their clinical team and the on-site clerkship director. In addition, students are encouraged to speak with their senior faculty preceptor about rotational concerns, problems or other career decisions. At a minimum, mid rotation feedback will be accomplished by the on-site clerkship director and documented for review by the Department of Surgery Education Committee.

STUDENT WORK HOURS

Students are expected to become part of the clinical team and attend all aspects of the service. Although no national policy exists with respect to regulation of medical student work hours, the USU School of Medicine has issued a policy stating that student work hours should mirror resident work hours. Thus, students are expected to work no more than 80 hours per week averaged over a 4 week period with in-house call responsibilities occurring no more frequently than 1:3. Students should have a period of 24hrs completely free of clinical responsibilities per 7 days, averaged over a two week period. Students are released from clinical duties on any given day by their team leader (usually the attending or chief resident) but are still required to attend lectures unless specifically excused by the on-site clerkship director. NNMC and WRAMC students are expected to attend preceptor session and visiting professor lectures unless excused by the Chief of Academic Surgery, Dr. Ritter. Students should address any concerns about work hours with the on-site clerkship director.

CLERKSHIP OBJECTIVES

Written objectives are available for your review at the USU Department of surgery website, <http://surgery.usuhs.mil/student.html>.

DEPARTMENT OF SURGERY GRADING POLICY

Students' grades in the MS3 Surgery Clerkship will be based on the following

General Surgery Clinical Performance Evaluation	40%
Required Prime Subspecialty Clinical Performance Evaluation	10%
Selected Subspecialty #1 Clinical Performance Evaluation	10%
Selected Subspecialty #1 Clinical Performance Evaluation	10%
NBME Surgery Shelf Exam	30%

1. Passing grade on the surgical shelf exam will be a baseline scaled score which is equivalent to the 10th percentile nationally. The Department has established the 10th percentile as the baseline-passing percentile.
2. Students who fail to pass the exam at the end of the surgical clerkship will be assigned a grade of "I" (incomplete) and be required to repeat the exam at the next offered exam session or at the general USU make-up exam session during winter break after rounds 1-4 and summer break after rounds 5-8.
3. Upon passing the make-up exam, the student will be assigned a maximum grade of "C" regardless of the score on the make-up exam.
4. Failure on the make-up exam will constitute a failure in 3rd year Surgery and the student will be assigned a grade of "F". This will require the student to be reviewed by the Student Promotion Committee. In addition, the student will be required to repeat 8 weeks of Surgery to include 4 weeks of General Surgery, and 4 weeks of a required prime subspecialties or SICU. The student must then take the next offered Shelf exam and achieve a passing grade. Their calculated Surgery grade will be a reflection of the remediated rotation. The initial "F", however, will be recorded on the student's transcript. Failure to successfully pass the remediated rotation will require the student to be re-reviewed by the Student Promotion Committee.
5. All grades are vetted through the Surgical Education Committee, which consists of the Chief of the Division of Academic Surgery, Chief of the Division of General Surgery, each of the on-site Clerkship Directors as well as the Department Chairman or his representative. The Surgical Education Committee reserves the right to adjust the above calculated grade based on documented evidence of poor/outstanding professionalism, officership, or integrity. Professionalism is a core competency to being a qualified military medical officer. USUHS clinical science courses all evaluate cognitive and non-cognitive performance. According to USU Instruction 1105, "Failure to demonstrate characteristics such as dependability, punctuality, professional and academic integrity, or ability to get along with patients and other members of the health care team, may lead to a grade of D, or F, even with adequate mastery of cognitive factors."

* Final grades will be sent by letter (email and hard copy mailed) to each student as soon as possible after termination of the rotation.. Grades are not provided by telephone. *

DEPARTMENT OF SURGERY GRADE APPEAL PROCESS

1. All appeals must be submitted in writing, letter or E-mail to the Chief of the Division of Academic Surgery within 14 days of the student's receipt of notification of grade.
2. The appeal will be reviewed by the Chief of Academic Surgery along with input from members of the Surgical Education Committee.
3. The student will be notified of the decision within 14 days of the review.
4. All appeals and the results of the appeal review will be placed in the student's permanent file and be reported to the Assistant Dean for Student Affairs and registrar.

ADMINISTRATIVE AFFAIRS

Students with administrative problems are encouraged to contact the on-site Clerkship Director at their clinical site. For situations requiring USU Departmental involvement, please contact the USU Department of Surgery Student Coordinator, Ms. Suzanne McCoy 301-295-5866 or smccoy@usuhs.mil.

WEBLOG

Students are required by the University to use the WEBLOG to log cases throughout clerkships. Failure to log between 30 and 50 cases for the entire clerkship will result in an Incomplete course grade. If you have difficulty logging in please contact Ms McCoy.

STUDENT EVALUATION OF CLERKSHIPS

Students are encouraged to comprehensively evaluate their experience on the surgical rotation and to discuss their thoughts with the senior surgical faculty. The Department is vitally interested in continual improvement of the curriculum, and student input and suggestions are needed.

In addition, students are required to complete the Clerkship Critique on-line after completion of their clerkship.

INTRODUCTION TO SURGERY COURSE INFORMATION

The Introduction to Surgery Course will include surgical experiences at the National Capital Area Medical Simulation Center, and an animate lab experience in the LAM facility at USU. Schedules for the Introduction to Surgery Course are included in the Welcome Packet. Students rotating at NNMC and BAMC will attend the animate lab on day one of the rotation and the Simulation Center on day two. WRAMC students will attend the Simulation Center on day one and the animate lab on day two. Any student who does not receive a schedule should contact the Department of Surgery's Student Coordinator @ (301) 295-5866

Minimum preparation for this course should include:

1. Review the anatomy of the chest and abdomen
2. Review 2nd year "Basic Surgical Skills Manual" and Dr. Wind's "Principle of Surgical Techniques". An additional resource for review of surgical knot tying is available through the online resource Vesalius. To access this resource, please follow these instructions:
 - Access web site www.vesalius.com. General access is free. To use advanced features (download images, create presentations) click on Subscribe, and follow the instructions for Military (.mil email address instruction). You will receive a token to receive a Free password.
 - Using Internet web browser, click on clinical folios, and browse down to the bottom
 - of the page to the topic "techniques."

Then find procedures. and advance until you find instructional programs concerning surgical knots, under which you will find descriptions of the following:

- Introduction and principles of surgical knots.
- Two handed surgical knots.
- One handed surgical knots.
- Basic instrument ties.

To advance to progressive instruction in each category, use the control icon at the bottom of each page.

3. Included in this handbook is the procedure manual for the animal laboratory. This is a quick read and should be reviewed in detail **BEFORE** the animate lab experience. We are one of the only schools in the world able to offer this experience to medical students so be prepared.

SCRUBS

Students reporting to LAM are to procure scrub suits in the Bay A section of the Anatomical Teaching Lab (ATL). Male students should change in the locker room by the small gym, the females in the ground floor ladies room. Students should not use the small locker room within the animal lab, which is reserved for the Faculty. When dressed, proceed to entrance G171. There will be an obvious entrance call button to the right of the door handle which should be pushed. Identify yourself as an MS-III student assigned to be in the animal lab and once recognized the door will be unlocked. Please check your Welcome Packet for course time and date information.

INTRODUCTION TO SURGERY COURSE ANIMATE LAB

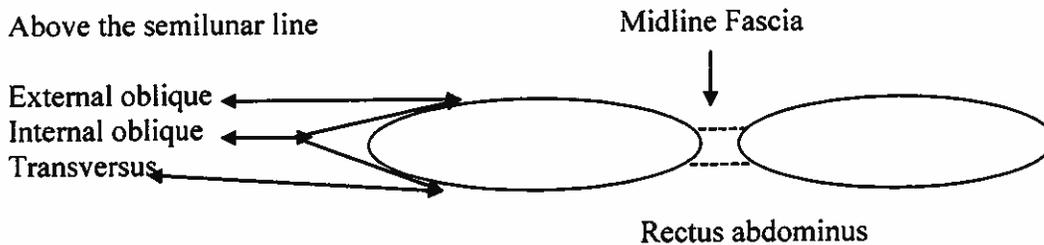
ANIMATE LAB GOALS AND OBJECTIVES

1. Demonstrate the importance of sterile technique, including gowning, gloving, respect of sterile field.
2. Demonstrate the names and use of instruments, and how they are employed in surgical operations.
3. Demonstrate methods to stop hemorrhage, including the use of pressure, clamping and suturing.
4. Demonstrate the proper techniques of placement of chest tubes, drains, and catheters.
5. Be able to make incisions, and close incisions.
6. Demonstrate the proper handling of tissue, including exposure, positioning, lighting, traction and countertraction, and retraction.
7. Demonstrate basic surgical procedures, including intestinal anastomosis, extraction of certain organs, etc.
8. Become familiar with the care for the live animal while under the influence of general anesthesia, including monitoring of vital signs, administration of IV fluids and drugs, etc.
9. Begin to learn the language and culture of surgery.
10. Learn the importance of surgical teams, the role of the first assistant, and the successful conduct of an operation.

ANIMATE LAB PROCEDURES

Celiotomy

The performance of an abdominal operation requires knowledge of the basic muscular and fascial anatomy of the abdominal wall. While there are many approaches to entering the abdomen, the most common is the midline incision. The midline fascia is made up of a conjoining of the external oblique, internal oblique, transversus and rectus muscles.



Below the semilunar line all fascial layers are anterior to the Rectus muscle. The peritoneum lies deep to the Rectus.

Once the abdominal cavity is entered, the first standard maneuver is the abdominal exploration. This is begun in an orderly manner beginning with the esophogogastric junction at the hiatus. The stomach is then followed and felt for masses or thickening to the pylorus. The duodenum, small intestine and colon are then carefully "run" to observe for any abnormalities. Try to observe the junction between the large and small bowel noting the cecum. The colon will contain lumpy stool, which can be formed with pressure, which distinguishes it from a tumor mass. The liver is then felt and observed as well as the gall bladder on its inferior surface. The spleen located in the left upper quadrant and coursing to the midline is lifted and observed. Both kidneys are then felt in the posterior, lateral recess of the mid abdomen. Presence, size and irregularities are noted. The bladder is then observed and will usually be distended. Lastly, the aorta is seen and felt by retracting the abdominal contents to the right.

The potential hazards of this procedure include:

1. Failure to observe all structures.
2. Failure to identify existing pathology.
3. Bleeding
4. Infection

Stomach Procedures

Elevate the stomach and feel the esophogogastric junction. Attempt to visualize the vagus nerves anteriorly on the left and posteriorly on the right. Following this, trace the stomach to the pyloroduodenal junction. Observe the pylorus and feel the muscular thickness. Identify the vein of Mayo. Be sure to visualize the short gastric vessels and their relationship to the spleen. Note the great omentum. Open the great omentum between vessels and identify the lesser sac and the pancreas.

Gastrotomy

The gastrotomy is used to visualize the gastric mucosa and facilitate biopsy procedures.

Place two 2-0 silk sutures in the anterior wall of the stomach about two inches apart. Place small clamps on each suture to allow for elevation of the anterior wall of the stomach. Using the cut/coag phase of the cautery, incise into the anterior stomach wall. At the level of the pouching mucosa, grasp the mucosa with two clamps and open into the lumen of the stomach. Aspirate the gastric contents. Place the index finger into the stomach and feel the rugal folds and the inside of the pylorus. If possible, feel the gastroesophageal junction from the inside.

The gastrotomy is then closed in one or two layers. There are several closure techniques that are acceptable. The preceptor will discuss these. The important point is to be assured that the closure is watertight and does not leak.

Potential hazards of this procedure include:

1. Failure to observe endogastric pathology.
2. Leakage of gastric contents through the closure.
3. Bleeding at the closure site.

Pyloroplasty

The purpose of a pyloroplasty is to augment gastric drainage after vagal resection has been performed for the treatment of peptic ulcer disease.

Place two 2-0 silk sutures in the superior and inferior poles of the pylorus. Place clamps on the ends for traction. Using the cut/coag phase of the cautery, divide the pylorus in a longitudinal manner. Be sure that all muscle fibers are divided and the mucosa is identified. The closure may be accomplished in one or two layers, but is performed in the transverse plane beginning at the superior and inferior poles and working towards the middle. The closure technique will be discussed and demonstrated by the preceptor. A watertight closure, which does not narrow the pyloric lumen, is essential.

Potential hazards of this procedure include:

1. Incomplete division of the pyloric muscle.
2. Leakage of gastric contents through the closure.
3. Luminal obstruction.

Splenectomy

The spleen is located in the left upper quadrant and courses to the anterior midline in the pig. Carefully feel the superior splenophrenic and inferior splenorenal attachments. Observe the gastrosplenic omentum containing the short gastric vessels and identify the splenic hilum containing the splenic artery and vein.

The dissection is begun by gently elevating the spleen from the left upper quadrant. The investing ligaments must be divided by cautery and sharp dissection. All vessels should be double clamped and then divided between the clamps. Silk ligatures should be securely tied with

a square knot. When the posterior attachments have been freed, place a rolled large sponge behind the spleen to keep it elevated. The gastrosplenic ligament is then divided by opening a small window besides a small vessel group, double clamping and dividing the vessels and ligating with silk ties. The preceptor will demonstrate the technique. Following this maneuver, the splenic artery and vein can be isolated by sharp dissection. These vessels should be freed of surrounding tissue for about 2-3 cm by sharp and blunt dissection and clamped at both ends of the dissection. The vessels are then divided and secured by either double ligation of 2-0 silk or a suture ligation. Another method of ligating these vessels is ligating in continuity. The preceptor will demonstrate this technique. The spleen is then free to be removed. Carefully inspect the splenic bed for bleeding.

The potential hazards of this procedure include:

1. Tearing the spleen during manipulation.
2. Failure to secure a major vessel with uncontrolled bleeding.
3. Injury to the stomach or pancreas during dissection.
4. Subphrenic abscess.

Cholecystectomy

The gallbladder is located on the inferior surface of the right lobe of the liver. Often the organ is embedded deep within the hepatic parenchyma with only the posterior surface exposed.

Examine the associated anatomy including the relationships between the gallbladder and the pancreas and small bowel. Identify the foramen of Winslow and discuss the anatomic relationships of the foramen.

Begin the dissection by cleaning the tissue at the hilum of the gall bladder. Gently spread the investing tissue with a small clamp and dissecting scissors and identify the cystic duct emerging from the gallbladder. Trace the cystic duct to its junction with the common hepatic duct and trace the common duct superiorly and inferiorly for a short distance. This is quite important to be sure that the cystic duct is isolated. Tie the cystic duct with a 2-0 silk ½ cm. proximal to the junction to the common duct. Clamp the cystic duct 1 cm. proximal to the cystic duct tie and divide the duct. The cystic artery may be found just inferior to the cystic duct. The preceptor will discuss the anatomic variants of these relationships. The vessel should be freed of surrounding tissue in the same manner as the duct and divided between two silk ligatures. The gall bladder is then carefully dissected from the gall bladder fossa by blunt and sharp dissection as well as electrocautery. The preceptor will demonstrate this technique. Upon removal of the gall bladder, the fossa is checked for bleeding and the cystic duct ligatures are inspected.

The potential hazards of this procedure include:

1. Inadvertent injury to the common duct.
2. Ligation of the common duct.
3. Laceration of the liver.
4. Insecure ligation of the cystic duct and persistent bile leak.

Urinary Bladder Drainage and Inspection

The urinary bladder is located in the midline of the inferior abdomen. Upon opening the abdomen the bladder is usually distended. Observe the external relationships of the bladder, particularly the area where the ureters enter the posterior wall.

The bladder drainage is begun by placing a pursestring suture just below the dome. This is done with 2-0 silk. The needle is placed in a circular manner with the diameter of the circle approximately 1 inch. The needle is placed so that the gaps between the sutures are approximately ½ cm. The preceptor will demonstrate this procedure. When the pursestring is in place, the surgical assistant holds the ends taut while the surgeon carefully stabs the bladder within the pursestring circle. The second assistant immediately follows the stab wound by placing the suction tip into the bladder to drain the urine.

When the bladder is empty, the pursestring is tightened and tied closed.

Next, two stay sutures of 2-0 silk are placed in the anterior wall of the bladder and the bladder incised with the electrocautery between the two sutures. This incision should be between 2 and 3 inches. The mucosa of the bladder should be inspected and felt. The bladder trigone should be observed. Following inspection of the bladder, closure is carried out with a running, locked vicral suture. The preceptor will demonstrate this technique.

The potential hazards of this procedure include:

1. Leakage of urine into the peritoneal cavity when attempting to drain.
2. Failure to achieve a watertight closure with subsequent leakage.

Abdominal Closure

To perform closure of the abdomen all layers of the abdominal wall must be sutured to their corresponding anatomic structure on either side of the incision. While there are a number of different incisions that can be placed in the abdomen, closures of all types of incisions requires approximation of related fascial and muscle layers to each other. Other principles of the closure include identification of each structure, choice of appropriate closure suture, choice of suture technique, obliteration of suture gaps and secure tying of knots.

Identify all layers of the abdominal wall on both sides of the incision. Be sure to observe the fascial layers at the level of the semilunar line showing that there is no posterior rectus sheath below this landmark. Grasp each layer with an Allis clamp to define the separate layers.

The preceptor will discuss the choice of closure suture. The closure is begun at the superior end with the suture placed through the anterior rectus sheath, posterior rectus sheath, and peritoneum. If a running stitch is to be used, the suture is continued in an inferior direction making sure to include all layers to the level of the semilunar line. At this level, the anterior sheath and peritoneum should be closed to the inferior corner. Suture placement should be approximately 1 cm. apart. The running closure is usually carried out as a locked stitch but a non-locked runner is acceptable. If an interrupted stitch is preferred, a figure of eight stitch should be used. This will

be demonstrated by the preceptor.

Following fascial closure the subcutaneous tissue can be closed using an absorbable suture material. The purpose of this approximation is to obliterate any dead space cavities as potential sites of infection and offer no strength to the closure. The skin is then closed using either a simple running suture or a simple interrupted stitch.

The potential hazards of this procedure include:

1. Approximation of dissimilar layers.
2. Placing sutures too far apart leaving a gap for herniation.
3. Failure of tied knots with disruption of the suture line and dehiscence of wound.
4. Infection and/or dead space abscess.

Tube Thoracostomy

A chest tube is placed to reestablish normal physiology and dynamics to the pleural space. When the integrity of the pleural cavity is breached by air or fluid, the normal lung function is altered with subsequent changes in respiratory performance. The function of the tube and the drainage mechanism is to empty the pleural space of fluid or air and to reestablish normal pressure relationships during inspiration and expiration.

Chest tubes are placed in closed chests as well as in open chests following chest surgery.

Closed Chest Placement

The tube is placed at the level of the 5th or 6th intercostal space in the mid or anterior axillary line. The preceptor will discuss the reasons for choice of placement sites. A small 1-1/2 inch incision is made through the skin and subcutaneous tissue. A finger is then inserted to feel the direction of the intercostal space. A hemostat is then placed in the incision and repeatedly spread until the pleura is encountered. Often the chest cavity is entered at this point but that is of little importance. The chest tube is then grasped in the clamp with a small amount of the clamp tip as the leading edge. This is then replaced into the tunnel from the skin to the chest cavity and inserted into the chest in an upward direction. The clamp is then removed and the tube gently fed into the chest aiming for the apex. The tube is then connected to a water seal or suction to maintain normal intrathoracic pressure relationships. The tube is then secured by suture anchoring to the skin. The preceptor will discuss the many ways to do this.

Open Chest Tube Placement

With the chest open, identify the 6th or 7th intercostal space by counting from the apex at rib # 1. Make a 1-1/2 inch incision on the skin just below the level of the selected interspace. Using a hemostat, repeatedly spread in a slightly superior direction until the chest cavity is entered. The tube is then grasped in the clamp with a small amount of the clamp tip as the leading edge. The

tube is then fed through the tunnel into the chest and the clamp removed. The tube is then placed to the apex of the chest and attached to a water seal or suction apparatus. The tube is then secured to the skin by means of a suture anchor. See above.

Closure of the Chest

The chest closure requires a definition of the various layers of the chest wall. It is important to identify each muscle layer on both sides of the incision. The ribs should be approximated; however, often this closure does not closely appose the ribs. If a rib has been removed, often there is a considerable space below the intercostal muscle closure.

If an intercostal approach has been used the intercostal muscles need not be approximated. If, however, a rib has been excised the intercostals are usually well defined and can be approximated without difficulty.

The initial step is to place several pericostal sutures around the upper and lower ribs. These should be placed 1-2 inches apart. It usually takes 3-4 pericostals to close the ribs. These sutures should be strong and absorbable. A Bailey rib approximator is then placed on the upper and lower ribs to the incision. This should be closed to approximate the ribs as close as possible. The pericostal sutures are then closed. If the intercostal muscles are to be closed, the muscles are sutured with a 2-0 absorbable material such as catgut. The preceptor will discuss suture materials.

The serratus muscle is then identified and closed with a running locked 2-0 catgut suture from its anterior to posterior borders. Following this the latissimus dorsi is closed in a similar fashion. Often if the closure is begun in the center of the muscle, it can be closed in the anterior and posterior directions simultaneously. The subcutaneous tissue and skin are then closed.

Appendix 1: Surgical Clerkship Evaluation Forms

General Surgical Clerkship Evaluation

Student _____ Clerkship Site _____ Service _____
 Evaluator signature _____ Position _____ Date _____
 On-Site coordinator signature _____

Outstanding (A Level)
Average (B Level)
Below Average (C Level)
Deficient (D Level)
Not Applicable

Patient Care (Evaluate for organization and thoroughness)

1. History and Physical Skills

- Writes an orderly H & P and identifies critical findings
- Develops a symptom complex to construct diagnostic possibilities
- Develops a comprehensive list of appropriate possible working diagnoses
- Indicates ability to develop diagnostic testing plans for various patient problems
- Indicates ability to develop basic treatment plans for various patient problems

2. Inpatient Care Performance

- Understands and contributes to daily patient care
- Demonstrates recognition and can discuss changes in patient status
- Is aware of daily lab and test results and application to patient's care
- Can perform routine bedside technical procedures
- Writes appropriate progress notes

3. Outpatient Care Performance

- Attends clinics regularly and promptly
- Shows appropriate skill in evaluating and examining new patient complaints
- Can evaluate post surgical patient progress and recognize common complications
- Understands planning of continuing follow-up care
- Writes appropriate progress notes

Comments

Medical Knowledge and Application

1. Medical Knowledge

- Applies anatomy and patho-physiology to patients disease and symptom complex
- Augments knowledge of patient problems with appropriate and timely reading
- Is prepared to discuss patients disease and treatment
- Recognizes and understands causes and treatment of surgical complications

Outstanding (A Level)
Average (B Level)
Below Average (C Level)
Deficient (D Level)
Not Applicable

2. Application

- Contributes on rounds with knowledge of patient data
- Is prepared for OR by prior reading and discussion of procedures
- Applies knowledge of disease to develop treatment plans
- Can perform basic technical procedures when indicated

Comments

Professionalism

1. Personal demeanor

- Demonstrates appropriate military demeanor (respect, honesty, ethics, morals)
- Accepts responsibility for actions and acknowledges mistakes
- Performs duties conscientiously and promptly with initiative and motivation
- Works within and beyond expected general duties (Clinic, OR, On-call)

2. Interpersonal relationships

- Works with and appropriately integrates with clinical team and peers
- Demonstrates respect to professional and non-professional allied personnel
- Demonstrates compassion and respect in patient relationships
- Accepts instruction and correction professionally

Comments

General Clerkship Skills

- Demonstrates acceptable presentation skills (organization, data, delivery)
- Writes in an organized manner
- Shows appropriate demeanor when involved in urgent or emergency situations
- Demonstrates acceptable technical skills appropriate for training level
- Showed improvement over the course of the clerkship experience

Comments:

How would you rank the performance of this student to others in the clerkship

USUHS Medical Student Evaluation Surgical Sub-specialties Clerkship

Student Name: _____ Rotation Service: _____

Facility: _____ Date of Rotation: _____

	Unacceptable performance; remediation necessary (<1% of students)	Marginal; performance is below peers but meets objective (5-10% of students)	Average; performance is on a par with his/her peers. MOST STUDENTS WILL BE IN THIS COLUMN	Above average; high level of performance compared to other students (<20% of students)	Outstanding performance; excellence in every aspect of objective, far beyond level of training (<5% of students)	No basis for evaluation
Patient Care						
History-taking						
Physical exam						
H&P write-up						
Establishes an effective relationship with patients						
Outpatient Clinic performance						
Care of inpatients						
Medical Knowledge						
Formulates a problem list						
Formulates a differential diagnosis						
Is able to interpret basic lab, X-ray results						
Formulates basic diagnostic and therapeutic plans						
Applies anatomy and physiology to disease and symptom complex						
Demonstrates knowledge of patient problems with basic reading (textbook)						
Supplements basic reading with additional self-directed learning						
Prepares for the						

Operating room						
Overall fund of medical knowledge						
	Unacceptable performance; remediation necessary (<1% of students)	Marginal; performance is below peers but meets objective (5-10% of students)	Average; performance is on a par with his/her peers. MOST STUDENTS WILL BE IN THIS COLUMN	Above average; high level of performance compared to other students (<20% of students)	Outstanding performance; excellence in every aspect of objective, far beyond level of training (<5% of students)	No basis for evaluation
Interpersonal Communication						
Written documentation skills						
Oral Case Presentation skills						
Respects professional and paraprofessional personnel						
Treats patients with respect and compassion						
Functions effectively as a member of the health care team						
Professionalism						
Performs duties promptly and conscientiously						
Accepts constructive criticism professionally						
Demonstrates a strong work ethic						
Assumes responsibility and is reliable						
Demonstrates initiative						
Demonstrates efficiency						
Demonstrates integrity						
Demonstrates proper military bearing						

- Recommend**
- Honors (<10% of students)
 - Pass
 - Fail

Comments: (required)

Evaluator Name: _____ Signature: _____

On-Site Coordinator Signature: _____

Appendix 2: Student suggestions for Exam preparation

See below for a few suggestions from prior students as to how to prepare for the NBME Shelf exam....

It was a tough test, but I feel like students that have the correct study materials have a much better chance of doing well on the exam. I know that if my colleagues studied some of the books (that I found extremely helpful) that the overall score from USUHS would go up and reflect well on our program.

All in all I learned quite a bit during the 12 weeks at NNM, and I think it is even more important to supplement our in-house learning opportunities with readings. The material I used was NMS casebook the night before a specific surgery in order to prep, and then I would use Surgical Recall right before the operation because many of the staff liked to ask questions right out of the book. As for the shelf, I did 10 questions a night out of USMLE step 2 from USMLE world over the entire 12 weeks. This adds up to quite a bit of questions covered, and I truly believe it helped me get a broader understanding of the subjects applicable to the rotation. I also used Kaplan surgery prep, which was about a 200 page booklet available online. This was the key to the shelf. If every student could read this 3 or 4 times until they knew it cold, they could answer questions faster and better, which would leave more time for really difficult questions. I have been telling everyone about this Kaplan surgery because I believe it will boost everyone's score and make our school look great to outsiders.

For the surgery shelf exam I did a lot of reading a lot of questions. I read Lawrence, our issued book. I didn't make it through the specialties book but I made it through all of the general surgery book. That along with NMS Casebook was nice because I got a lot of repeat between the two. I also did the NMS questions from their surgery book, and the questions from PreTest. Again, I saw a lot of repeated information, which is very helpful to me.

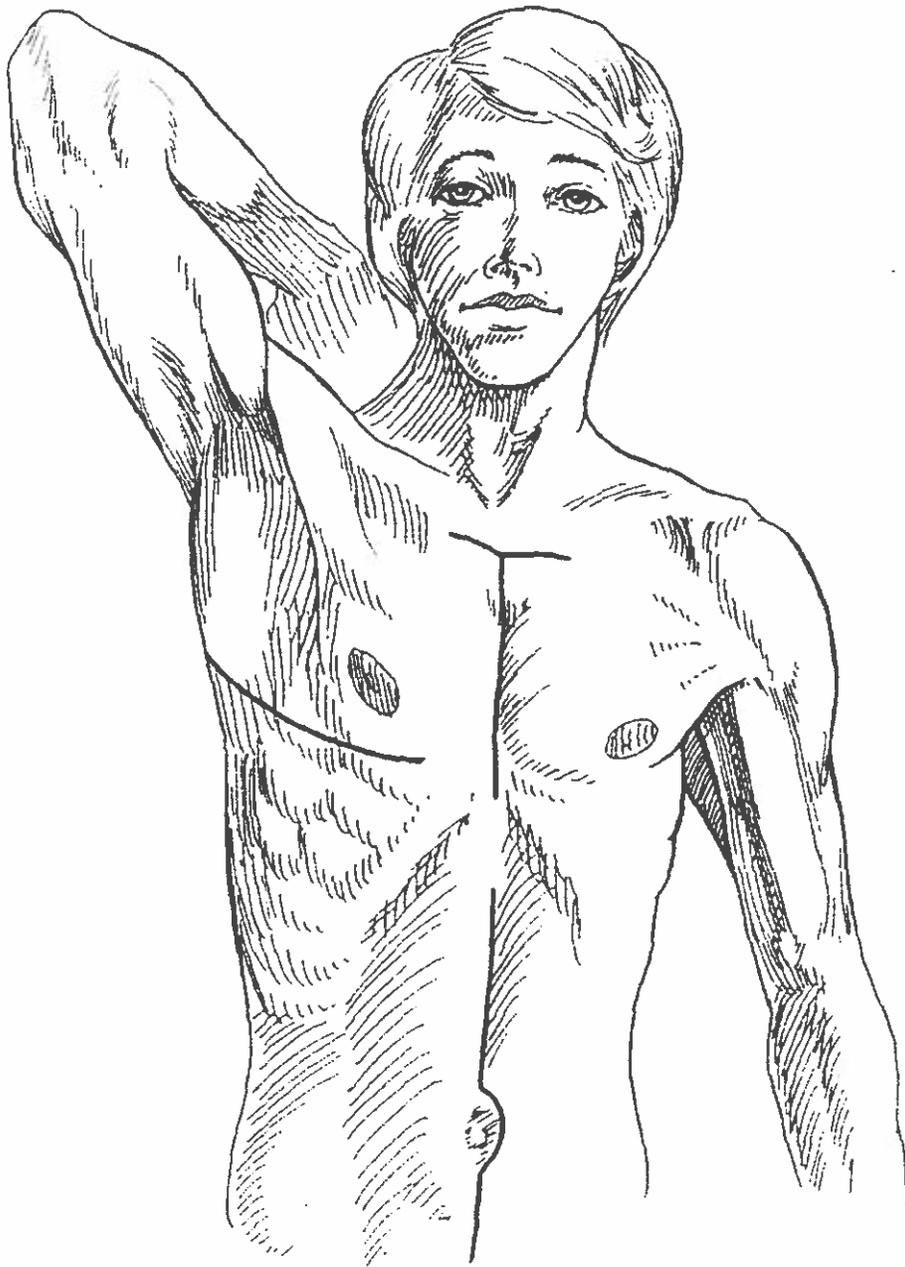
The lectures at BAMC were very helpful too!

I tried to read every day for a little bit, even if I couldn't get a full hour in. I used the issued Lawrence text book to prepare for the WRAMC daily lectures for the first half of the rotation. Then I switched to the NMS Casebook (not the textbook). I also flipped through 1st Aide for surgery, and I did about 450/500 questions from the Pre-test surgery question book. I tried to do a handful of questions every day and read a topic or two out of NMS Casebook each day. Hope this helps.

For the shelf I read all of NMS casebook and memorized Pestana review cold. For practice questions I just used PreTest and did all the sections except anesthesia and fluids/electrolytes. The anesthesia powerpoints were sufficient and the fluids/electrolytes chapter of Surgical Recall was well done. The issued textbook was too dense to read so I supplemented my studying with First Aid for Surgery.

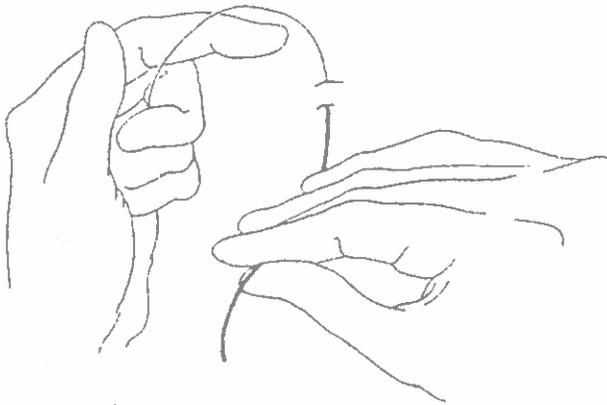
Anyways my study strategy for the exam included reading NMS surgery, instead of Lawrence as it was in outline form and easier for me to process, I also read the NMS casebook, did questions from a question bank and went over the Pestana review.

During my rotation I spent quite a bit of time discussing high yield topics with my residents where we made sure to tease out important testable details and distinctions, I think this helped me the most. It helped me understand the depth of knowledge that I needed for the exam.



Incisions such as the sternotomy, lateral thoracotomy, and midline abdominal incision cause minimal pain because they lie between neural territories.

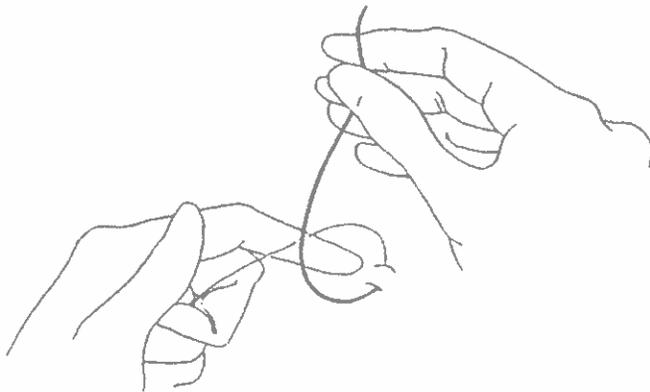
Surgical Knots: Two-Hand Tie



The left index finger is in position to set up the loop.



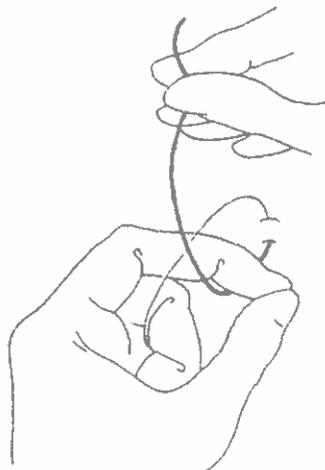
Swing thumb and index finger to the opposite side of the loop to grasp the working strand. Shift the right shoulder in toward the table to make this move comfortably.



Form a loop over the index finger, using the working strand in the right hand.



Pass the working strand cleanly through the loop and regrasp it with the right hand.



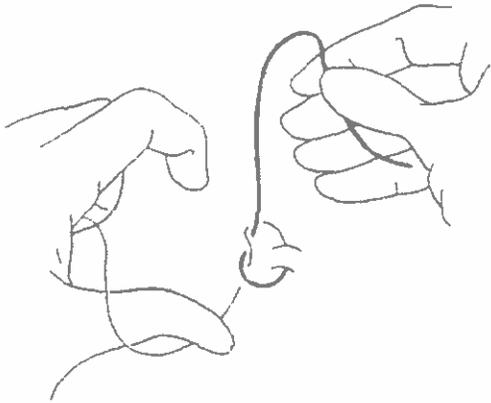
Pinch left thumb and index finger together away from the intersecting strands of the loop.



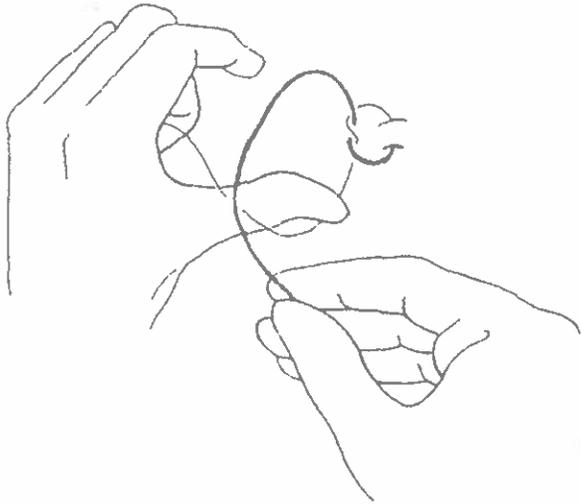
The left index finger is now in proper position to put down next to the knot as the working strand is pulled to the side opposite the operator. The strands and knot are kept in a straight line each time a throw is tightened.

To make a surgeon's or friction knot, repeat the steps shown in Figs. 3.11 through 3.13 to pass the working strand through the first loop two times.

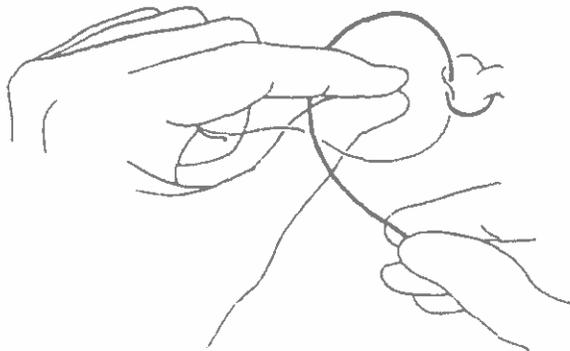
Surgical Knots: Two-Hand Tie



The thumb is held perpendicular to the plane of the strands.

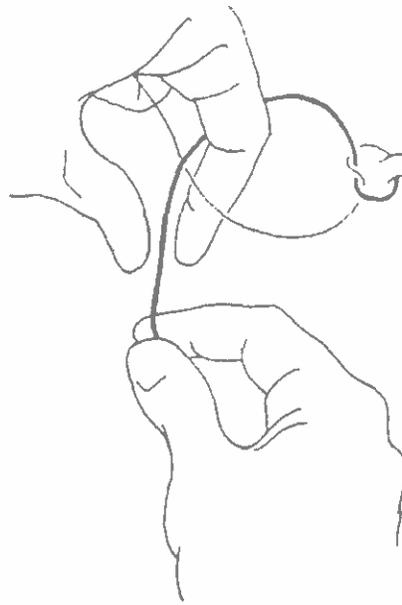


Form a loop over the thumb, using the working strand in the right hand.

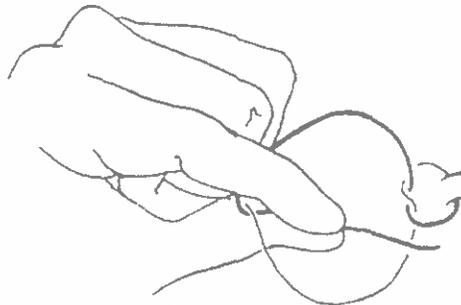


Pinch left thumb and index finger together, keeping clear of the loop

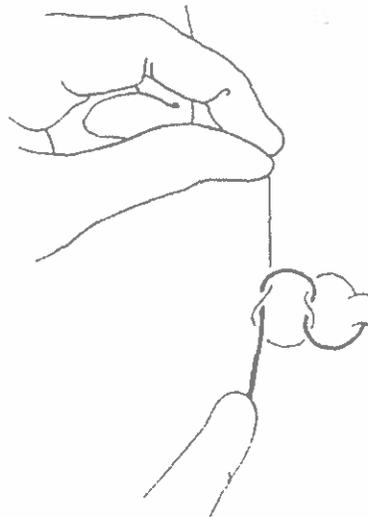
In the two-hand tie the left hand takes an active part in setting up the loop and manipulating the working strand. It is important to do the pinching maneuvers away from the loop to avoid entanglement.



Swing thumb and index finger to the opposite side of the loop to grasp the working strand. Rotate the left shoulder in toward the patient at this point.

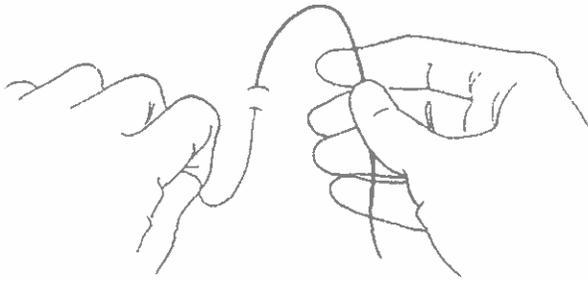


Pass the working strand through the loop and regrip it with the right hand.



The right index finger is now in proper position to put down next to the knot as the working strand is pulled toward the operator. For either throw the opposite index finger may also be pronated on its strand for added precision.

Surgical Knots: One-Hand Tie



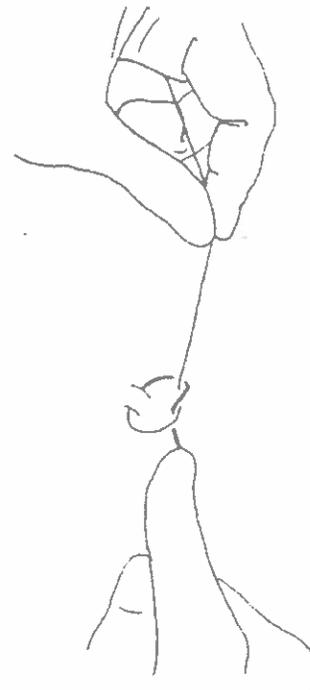
Drape a comfortable length of working strand over the fingers of the right hand, grasping the strand with the thumb and middle fingers.



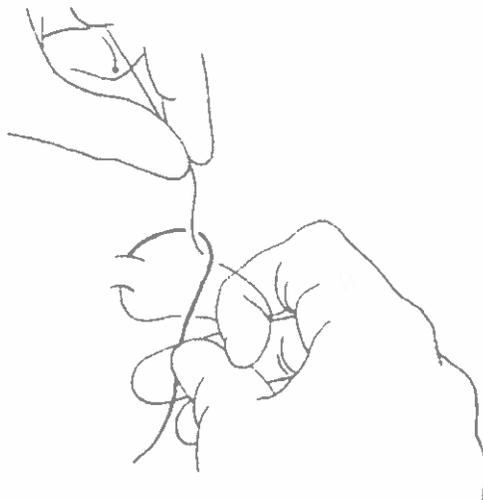
Sweep the working strand through the loop with the index finger.



Move the nonworking strand over the right index finger to set up a loop.



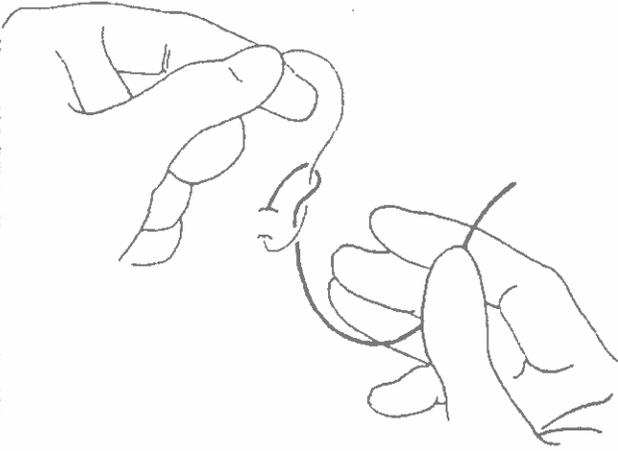
Grasp the working strand with the right hand and tighten with the right index finger.



Flex the right index finger, catching the nonworking strand.

Note that the working strand has finished opposite to where it started. Keeping a smooth open loop until the throw is tight helps keep this key relationship clear. It also prevents reversing the throw into a half hitch, which happens more frequently with the one-hand tie. If the left (or nondependent) index finger were placed below the knot, the throw would be reversed into a half hitch.

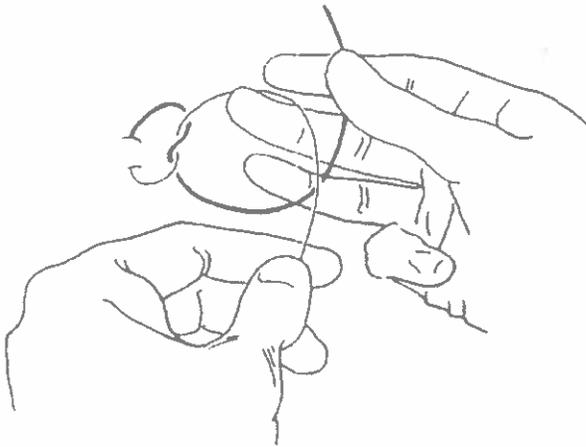
Surgical Knots: One-Hand Tie



Drape the working strand over the fingers of the right hand from the ulnar side, with the thumb and index finger grasping the strand.



Flex the middle finger to pull the nonworking strand behind the working strand.

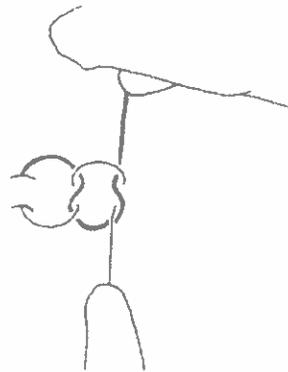


Move the nonworking strand over the right middle finger to set up a loop.



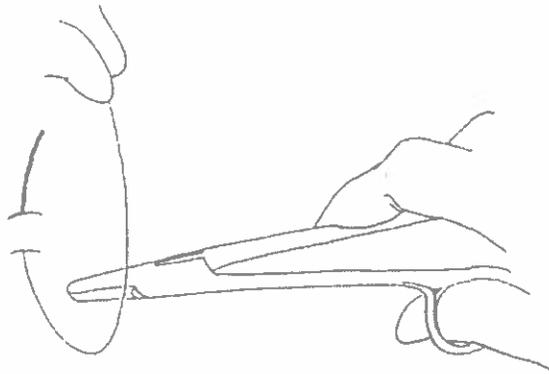
Sweep the working strand through the loop, using the right middle finger.

In the one-hand tie the right hand sets up the loop and manipulates the working strand. Compare this to the two-hand tie.

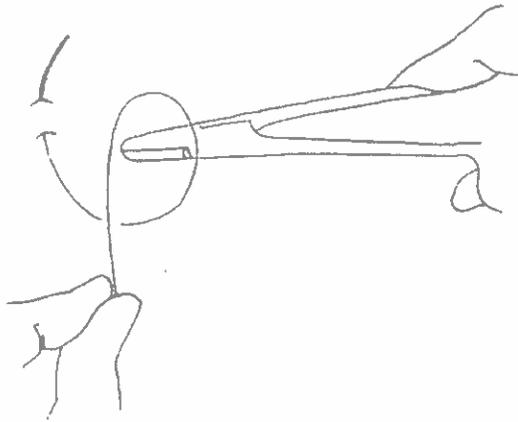


Tighten the throw with the left index finger.

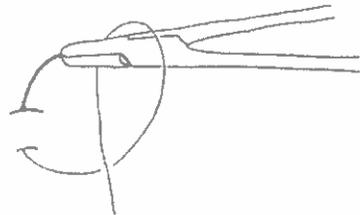
Surgical Knots: Instrument Tie



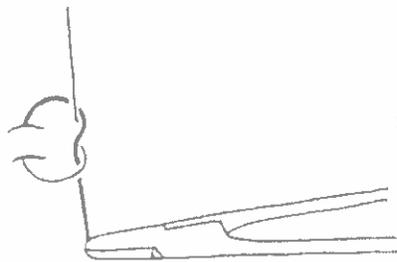
Hold the needle-holder parallel with the incision or vessel being tied. Drape the nonworking end over the instrument. Leave the working end short.



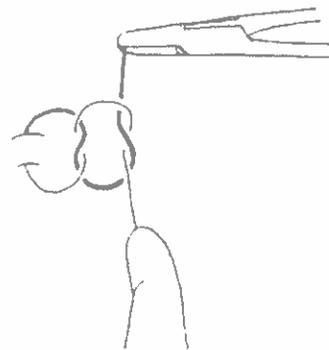
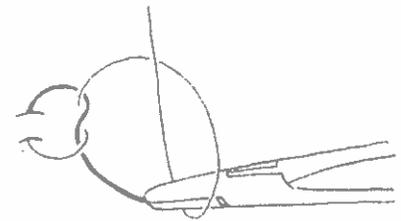
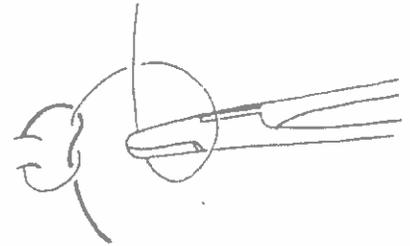
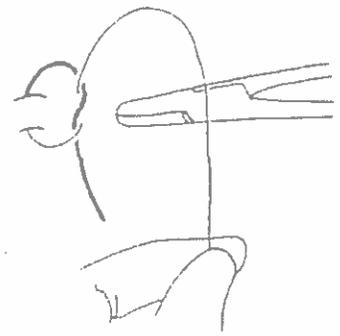
Form a loop around the instrument. Make a double loop if a friction knot is desired.



Grasp the end of the working strand.



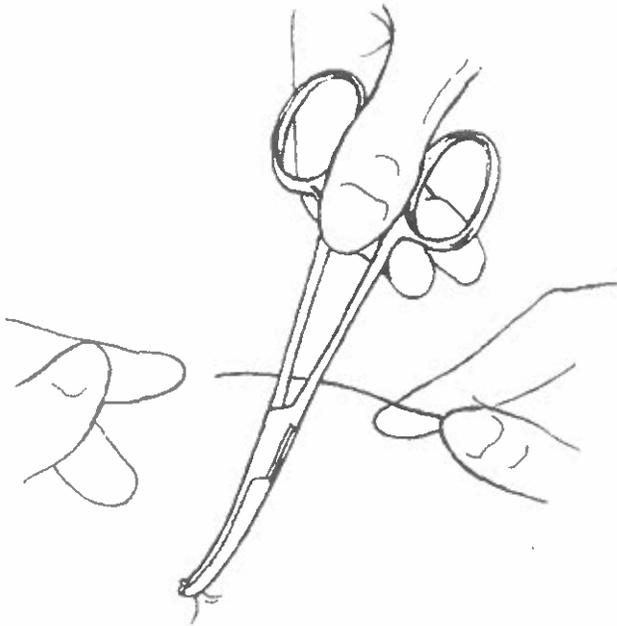
Reverse the nonworking strand and bring the working end toward you.



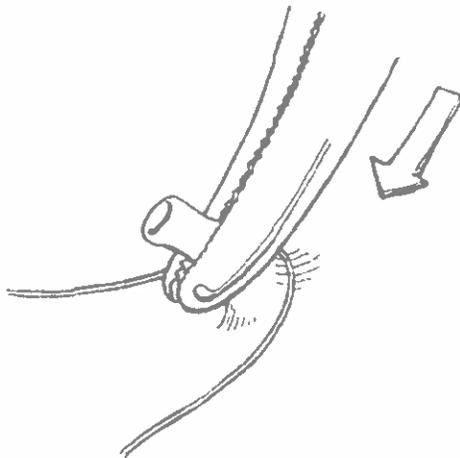
Repeat the first four maneuvers shown in the left column in the opposite direction

This tie is useful when working with very fine suture material and when multiple knots are needed, e.g., as in tacking down a skin graft. The needle-holder need not be held rigidly perpendicular to the axis of the loop but will move naturally to assist formation of the loop as you get a feel for this tie.

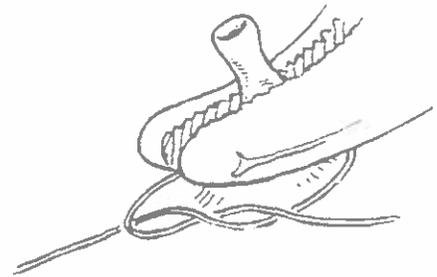
Basic Surgical Maneuvers: Clamps



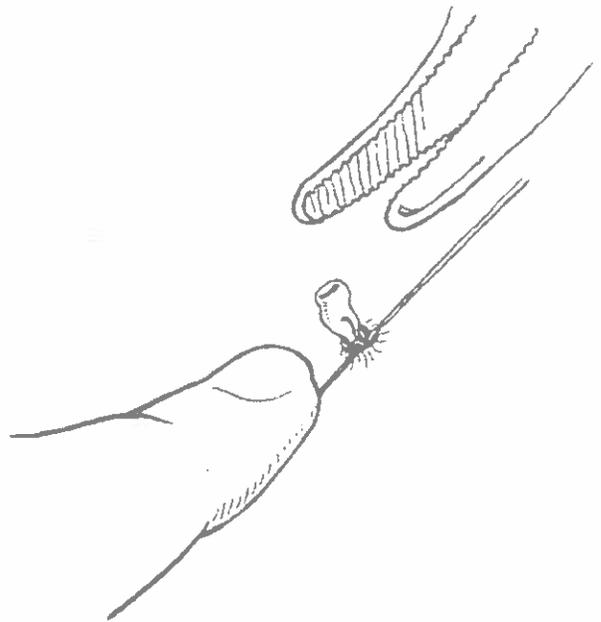
When dealing with multiple clamps, take the most accessible one first and proceed in logical order. The clamp is elevated without pulling on the clamped structure. The ligature is passed behind.



The ligature is slid down the heel of the clamp as the clamp is lowered to a horizontal position. If the clamped structure is too deep to trap the strand before tying, the first throw may be made high on the clamp and slid down into position.



The tips are elevated and exposed without pulling. The first throw is placed just below the clamp, the strands are oriented parallel to the axis of the clamp.

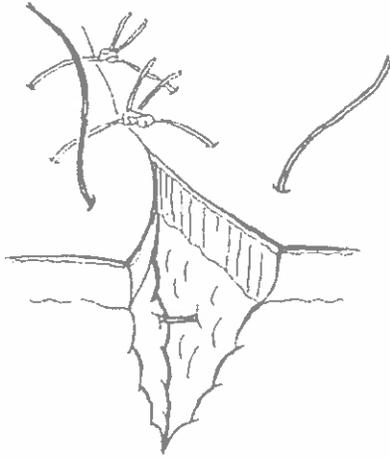


The knot is tightened and tension is maintained as the clamp is slowly released. A few small, quick tugs are most effective for securing each throw without breaking the suture material. There is extra give as the tissue splayed by the clamp is released. Note that the two strands and the knot form a straight line, and no tension is placed on the vessel! If the vessel is large, it may be advisable to flash (open and reclamp) the clamp and place a second tie or suture ligature.

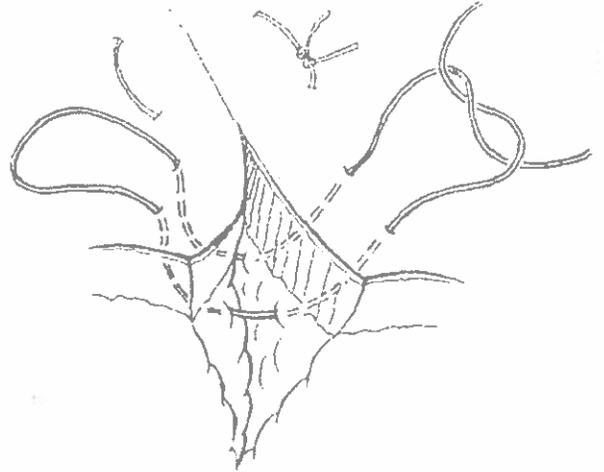
A good assistant should be able to control the release of a clamp with either hand.

Basic Surgical Maneuvers: Suture Patterns

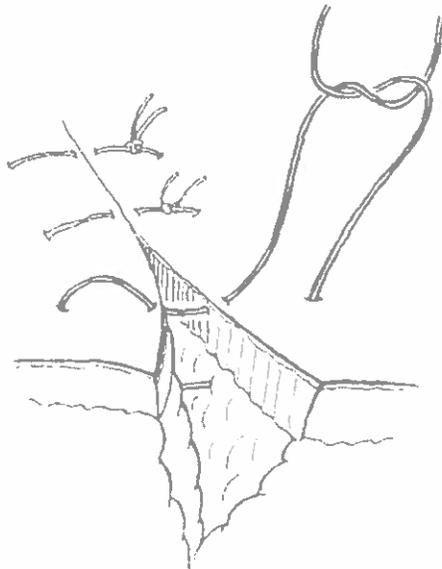
Several basic suture patterns are presented in Figs. 5.60–5.73, with elaboration on skin suture technique. Stitches used for abdominal closure and retention sutures are discussed in the chapter on laparotomy.



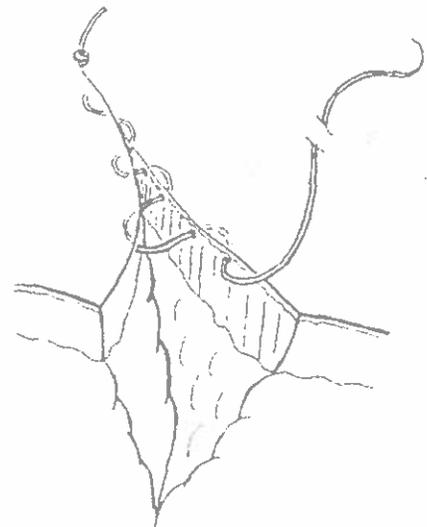
The *simple suture* should have a square profile to avoid inverting skin edges. This is accomplished as shown in Figs. 5.64–5.68. A good general rule for placement is that the width of each stitch equals the distance between sutures. The width varies with the thickness of the skin, the location, and the purpose of the suture.



The *horizontal mattress* is an everting stitch that is more commonly used in fascia than in skin.

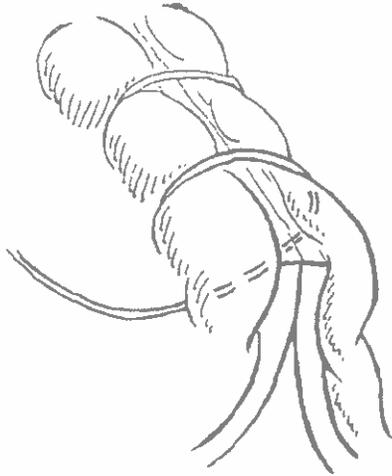


The *vertical mattress* is used when precise edge approximation is important and cannot be achieved with a simple suture. This is the most common skin closure pattern. It consists of two tiny epidermal-thickness bites of the edges, added to the simple suture. Gentle, loose approximation allows for the edema that inevitably follows wounding.

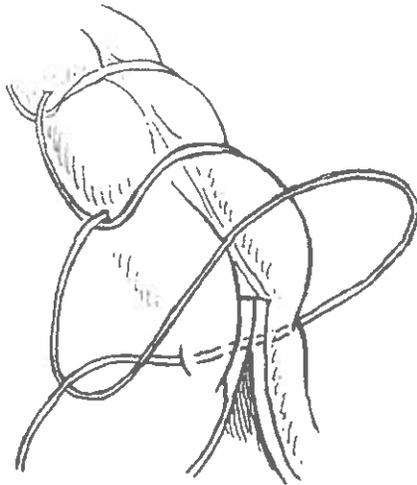


The *subcuticular closure* may be interrupted or continuous. It may be done with absorbable or nonabsorbable material. In the former case the end knot is usually buried. The technique is discussed in more detail in the section on minor surgery.

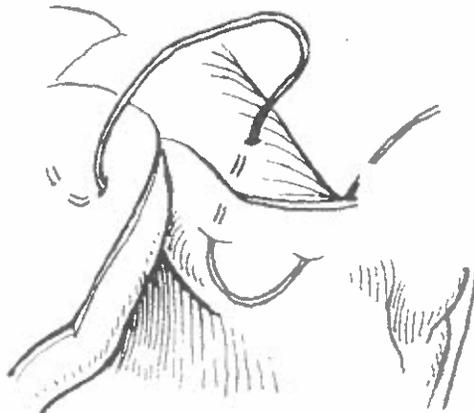
Basic Surgical Maneuvers: Suture Patterns



The simple over and over *continuous suture* is the one most often used on bowel. The continuous suture is quicker than the interrupted suture and may distribute tension more evenly. Care must be exercised not to pull too tightly, however, or a rigid purse string results, which can compromise the lumen at an anastomosis. Another disadvantage of continuous suture is that a single break compromises the entire suture line. The needle should be released and the suture should be periodically untwisted when doing a long continuous row. The surgeon sets the tension for each stitch of a continuous suture, and the assistant holds the strand at that tension while the next stitch is placed.



A *continuous locking suture* is created by passing the needle through the loop of the previous stitch. The purpose is to prevent slippage and to aid hemostasis in a cut edge. The assistant flips the loop over so that the surgeon automatically withdraws the needle through it.



The *Connell suture* is a continuous inverting suture commonly used for the first layer (anterior wall portion) of a bowel anastomosis. The technique is discussed with small-bowel resection.