SURGICAL TECHNIGRAMS

F.M. AL AKL, M.D.

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F. M. AL AKL, M.D.

ASSOCIATE ATTENDING SURGEON
KINGS COUNTY HOSPITAL

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Foreword

Years of work with aspiring interns have confirmed my own earlier longing for a concise book of reference on the technique of basic operative procedures. Most volumes on surgery are, in effect, guides to the care of the surgical patient from clinic admission to hospital discharge. Such presentations fail to place the necessary emphasis on anatomy, and, by their very breadth, dilute the technical image which the student seeks and needs.

In this work, all variables, such as details of preoperative preparation, anesthesia, suture material, postoperative care, and other nontechnical considerations, have been eliminated. Instead, only the actual operative manipulation is presented. Each procedure is divided into a number of consecutive steps, and each step is described in terms of detailed surgical anatomy. The importance of precise dissection in the masterly execution of a surgical operation is constantly stressed. Emphasis, therefore, is placed upon what may be termed the *anatomechanics* of surgery. This being its scope, the work is intended to provide the volume to be consulted "the night before the operation."

Only descriptive anatomic terms are employed in the text, to the exclusion of irrelevant proper nouns often used interchangeably or pinned confusingly onto many structures. The illustrations depict structures from the viewpoint of the surgeon—not the academist. The academist commonly considers organs in terms of function alone and describes them in positions compatible with normal function. The surgeon at the operating table thinks in terms of "re-function," a concept which requires a more intimate knowledge of structural relationships. The importance of anatomic insight in surgery cannot be overemphasized. To the surgeon, knowledge of anatomy is light, its lack is darkness, and incomplete knowledge all the shades between.

Anatomic variations and differences in technique will always exist. Both are discussed, along with points of caution when indicated, in the Notes on Anatomy and Technique which follow each procedure.

Neither this nor any other volume can provide "the law." The creative student must continue the search between library, dissection room, operating rooms, and follow-up clinic to develop his own technique. Then in his maturing years he, too, may contribute his share to humanity's ever expanding treasure house of knowledge.

Preface

The enthusiasm with which "Surgical Technigrams" was received when first presented in *Modern Medicine,* and the innumerable requests both to the editors of the magazine and to the author for publication of the Technigrams in book form have culminated in the present volume. Besides those already published, many more were added to round out the work. The resulting selection comprises basic procedures and presents most of the operations performed by the general surgeon.

Essentially the work is a compilation of popular techniques for which neither the author nor the participating artists claim any originality. Effectiveness and simplicity of execution alone dictated the choice of each procedure. Minor variations are described when necessary to provide an instructive variety of methods. None the less the work remains fairly representative of the general surgical repertoire. The operations are grouped according to anatomic location. For added orientation, the introductory dissection sketches are planned to supplement one another in a manner to cover the surgical anatomy of the several regions involved.

Certainly the volume is not meant to set the final patterns of procedure or rigidly to standardize technique. Rather it is intended to train the student to think in terms of anatomic sequence so as to provide him with a foundation upon which his own technique may evolve.

The accumulated body of surgical knowledge is considerable, and its rate of growth is rapid. It becomes apparent that a superior organization of available knowledge and a simplified method of imparting that knowledge to the groping student is urgently needed. The author is hopeful that the present volume may in some measure fill this need. It is hoped also that the reader will make suggestions for the improvement of subsequent editions. All recommendations will be received with deep gratitude.

Acknowledgment

I am grateful to the editors of *Modern Medicine* for sponsoring the initial presentation of "Surgical Technigrams," and to members of the Kings County Hospital staff, as well as to the host of surgeons, both here and abroad, whom it was my privilege to observe and with whom many aspects of this work were discussed.

I am particularly indebted to John L. Madden, M.D., to Bernard M. Pines, M.D., and to Benjamin G. P. Shafiroff, M.D., for their invaluable help in the preparation of the text.

THE AUTHOR

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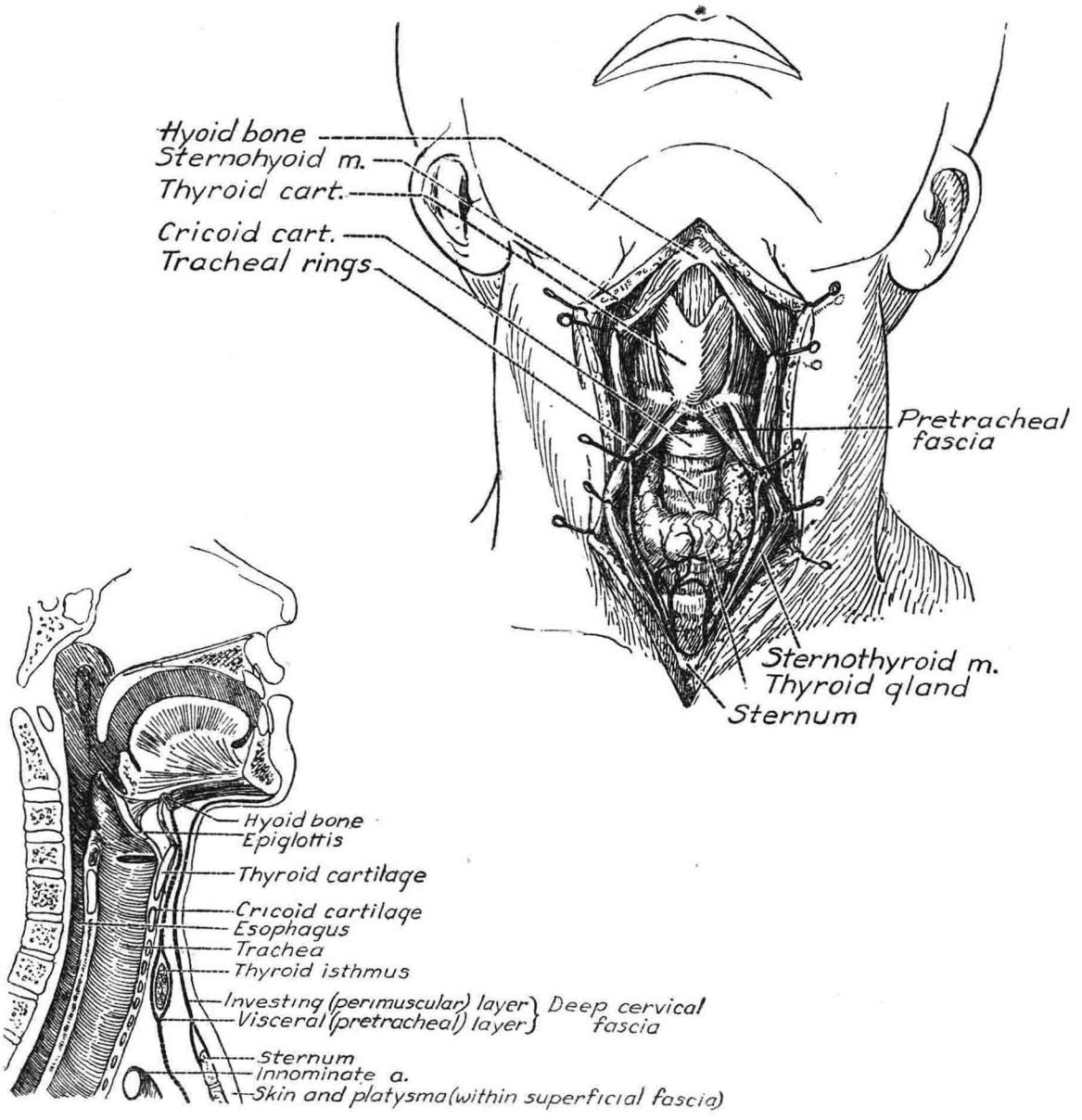
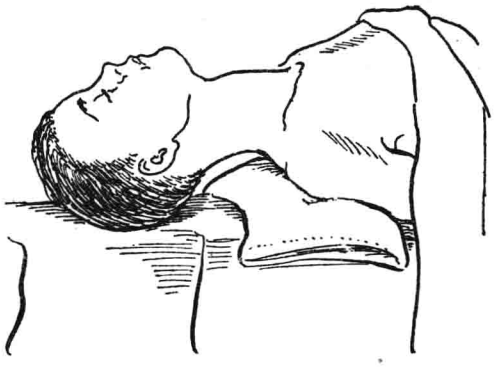
NECK

Tracheostomy

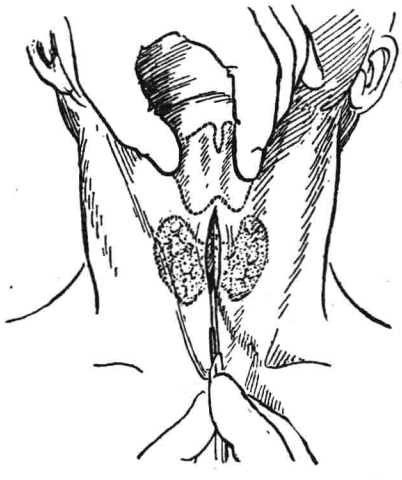


KEEP THIS PICTURE IN MIND

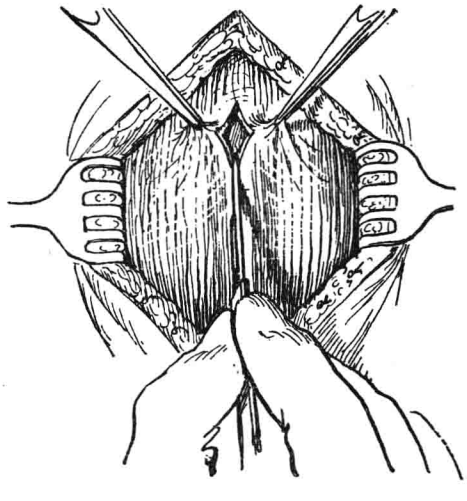
HIGH (SUPRAISTHMAL) TRACHEOSTOMY



1 Elevate patient's shoulders and extend neck. Prepare and drape operative field.



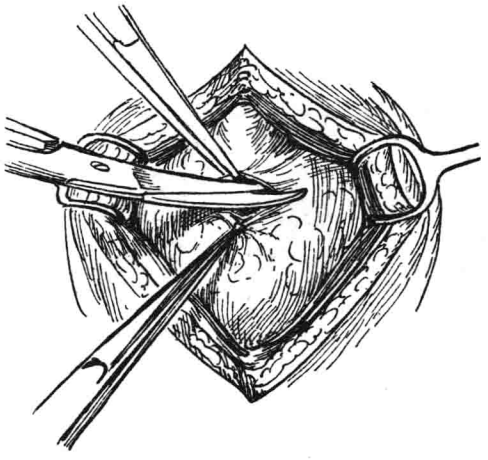
2 Palpate cricoid cartilage. Steady larynx by holding thyroid cartilage between thumb and index finger. Incise skin and subcutaneous fat in midline from cricoid knob downward to a distance of 5 cm.



3 Retract skin and bare deep cervical fascia. Pick up and incise fascia in the midline.

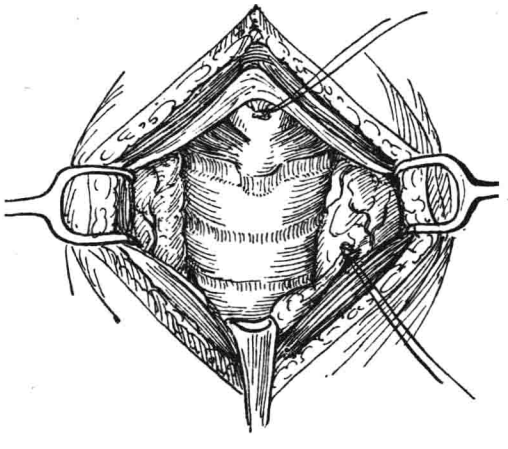
Retract fascia and ribbon muscles to either side. This exposes cricoid cartilage with pretracheal fascia attached. Scissor cricoid attachment of pretracheal fascia (suspensory ligament of thyroid gland) transversely.

4



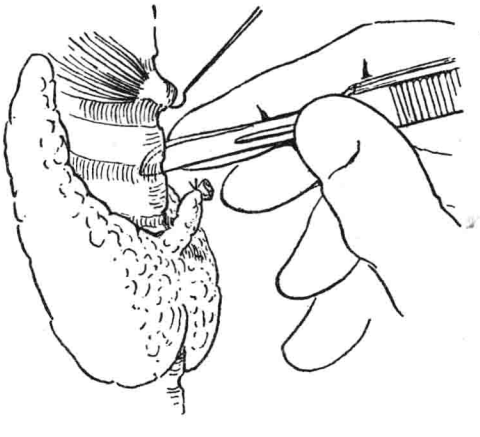
When present, retract pyramidal lobe of thyroid or ligate and cut its pedicle if in the way. Retract pretracheal fascia with thyroid isthmus caudad and expose upper tracheal rings.

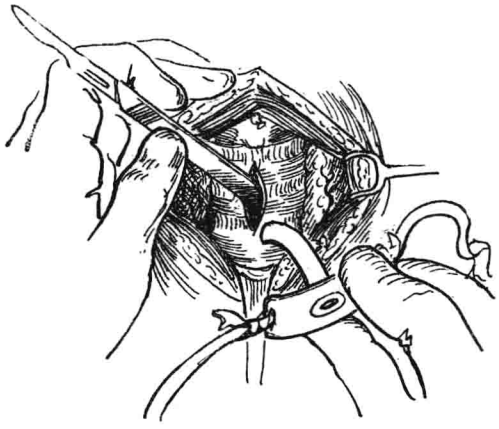
5



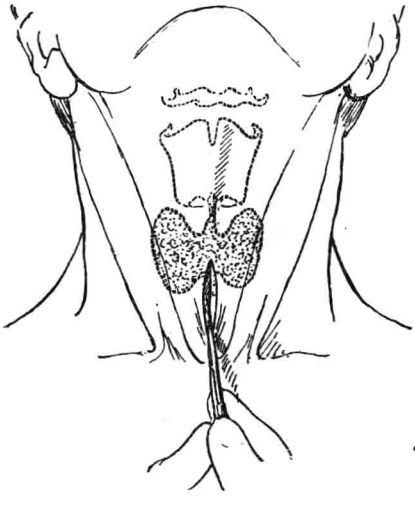
Steady cricoid cartilage by upward traction with hook. Cautiously plunge guarded point of scalpel, cutting edge upward, into lumen of trachea and sever uppermost one or two tracheal rings.

6



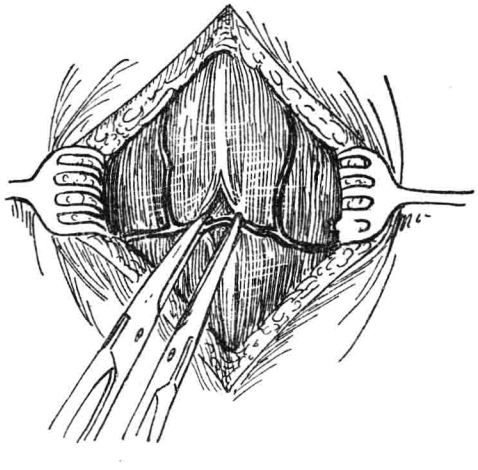


7 Introduce flat handle of scalpel into tracheal wound and rotate it transversely to open tracheal lumen. Introduce breathing tube.



LOW (INFRAISTHMAL) TRACHEOSTOMY

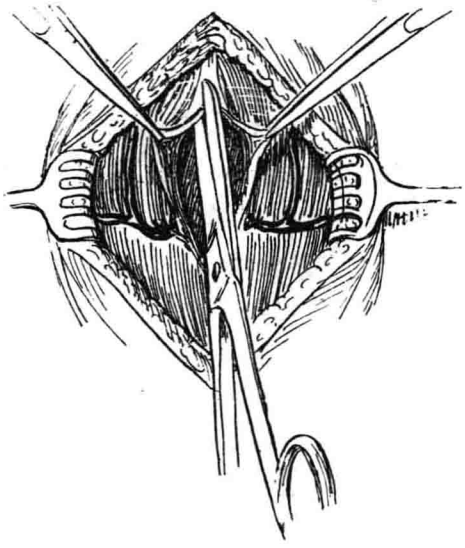
1 Incise skin and subcutaneous fat in midline from suprasternal notch cephalad to a distance of 6 cm.



2 Retract skin. Continue incision until deep cervical fascia is exposed. Watch for and ligate jugular venous arch where it crosses midline within deep cervical fascia.

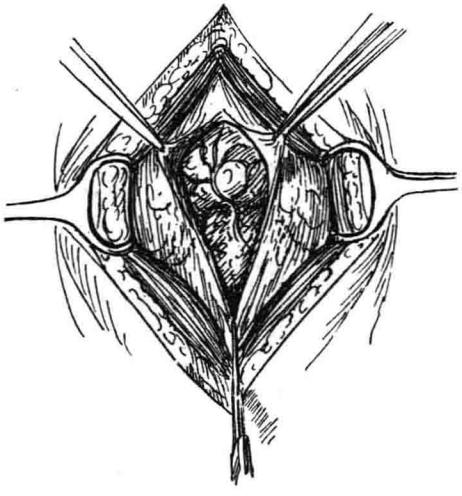
Pick up and scissor deep cervical fascia in midline.

3



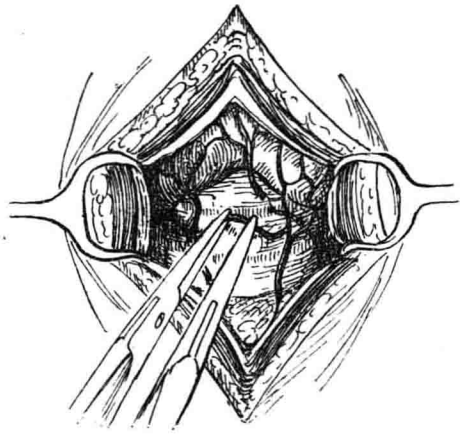
Retract ribbon muscles. Carefully incise pretracheal fascia in midline from thyroid isthmus caudad.

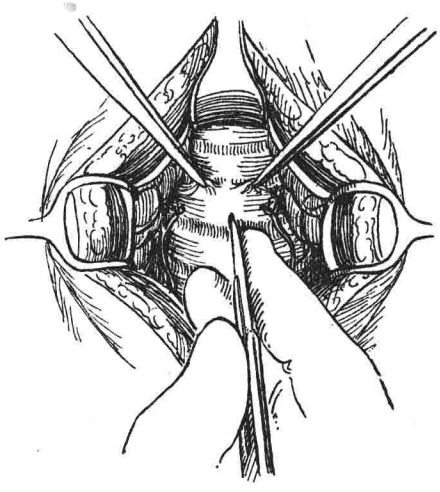
4



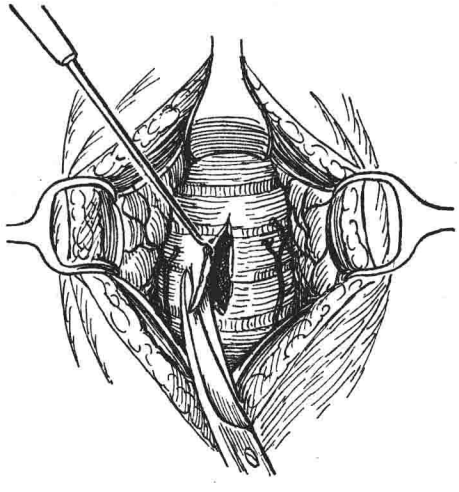
Retract pretracheal fascia. Ligate and cut thyroidea ima artery when present, as well as branches of pretracheal plexus of veins which cross midline.

5

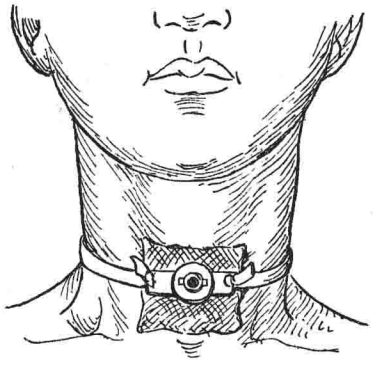




6 Retract thyroid isthmus cephalad and adipoareolar pad overlying innominate vessels caudad, and expose underlying tracheal rings. Steady trachea with traction clamp on either side. Plunge guarded knife tip, cutting edge upward, into tracheal lumen. Incise two or three of exposed tracheal rings.



7 Retract edges of trachea with hook. Trim edges to accommodate tracheal tube.



8 Introduce tracheal tube. Allow wound edges to fall together. Fasten tube around patient's neck with ribbon and dress wound.

TRACHEOSTOMY NOTES

ANATOMY

The *trachea* is a membranocartilaginous tube which stretches between the inlet of the larynx and the confluence of the right and left bronchus. It is composed of a series of incomplete cartilaginous rings connected by a fibroelastic membrane. The trachea is surmounted by the signet-ring–shaped cricoid cartilage. The cricoid, in turn, is crowned by the more prominent thyroid cartilage and connected to it by the cricothyroid membrane. The body of the thyroid cartilage is shaped like the breast of a bird and encloses the vocal cords. Both the thyroid and the cricoid cartilages are subcutaneous in the midline and are readily palpable when the neck is extended.

The *thyroid gland* lies astride the trachea in saddlebag fashion. Its isthmus, which connects both lobes, covers the second and third or fourth tracheal rings. The two lateral lobes of the gland extend cephalad, covering the lateral surfaces of the cricoid and thyroid cartilages. Occasionally a third, or pyramidal, lobe ascends from the isthmus toward the hyoid bone and may be encountered in a high tracheostomy incision.

During tracheostomy the following vessels should be watched for. On the superior border of the thyroid isthmus, the superior thyroid arch may be prominent. The arch connects the two superior thyroid arteries. At the inferior border of the isthmus, the thyroidea ima artery may be encountered. It is an inconstant vessel and runs deep to the pretracheal fascia between the isthmus and the innominate artery. The jugular venous arch crosses the midline in the lower part of the neck. It connects the two anterior jugular veins and crosses the midline within the deep cervical fascia. All three vessels should be ligated and sectioned when necessary.

The *esophagus*, transversely flattened between trachea and vertebral column, is located immediately behind the trachea along the cartilage-free segment of the tube. Its wall is separated from the tracheal lumen only by the thin fibroelastic casing forming the posterior wall of the trachea. It might be punctured if insufficient care is exercised during the tracheal incision.

TECHNIQUE

A low tracheostomy is the procedure of choice for establishing a tracheocutaneous fistula, since it is performed far from the larynx. In children, however, the cervical trachea is short and narrow and the thymus gland may overlie it, so that a high tracheostomy is simpler to perform.

The cervical trachea is a comparatively superficial structure covered by skin, subcutaneous fat, and the two layers of the deep cervical fascia. The thyroid isthmus may lie high up on the trachea. When it interferes with the necessary exposure of the trachea, it may be necessary to cut the thyroid isthmus between clamps.

In a high tracheostomy it is important to avoid injury to the larynx. The tracheal rings lie immediately below the cricoid cartilage. The tracheal incision should be made into the second or third tracheal ring to avoid postoperative edema as well as subsequent cicatricial stenosis of the larynx.

The trachea is a freely movable tube and, during incision, should be immobilized with hooks or clamps. It is also important to limit the depth of the incision by guarding the point of the scalpel with the finger. In this manner injury to the posterior tracheal wall and underlying esophagus may be avoided. This precaution is particularly important in children, in whom the tracheal lumen is small and whose tracheoesophageal septum is elastic and bulges to meet the knife during straining.