SPINAL ANESTHESIA

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Spinal Anesthesia

by

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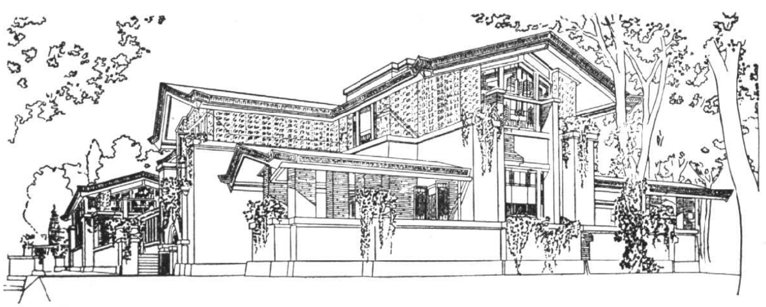

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PREFACE

This monograph is written in the hope that it will assist the physician who performs spinal anesthesia, but who has had neither the time nor the opportunity to explore some of its facets. It is hoped that it will be a stimulus to residents in Anesthesiology by causing them to look further into many phases of spinal anesthesia about which there is still much to learn.

The point of view taken on techniques and dosages is conservative but known to work within the limits prescribed.

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J.B.D.

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SPINAL ANESTHESIA

Chapter I

GENERAL CONSIDERATIONS

SPINAL ANESTHESIA, spinal analgesia, or subarachnoid block, is now a time-honored procedure for producing surgical anesthesia. It has gone through many alterations in details of administration during the more than sixty years since its introduction to medicine. Spinal anesthesia has been both praised and condemned. Those who use spinal anesthesia well and wisely praise it; those who do not understand it or use it incorrectly condemn it.

Spinal anesthesia, as is true of all procedures, has indications and contraindications. It may be done well or it may be done poorly. All anesthetic procedures have power of producing serious complications. If spinal anesthesia is used wisely and properly, however, it should produce less complications than any other type of anesthesia.

Spinal anesthesia may produce immediate and profound alterations in circulatory and respiratory physiology. In general, the alterations are proportionate to the level of the anesthesia. When spinal anesthesia is administered without full appreciation of the consequence that may follow, the results may be prejudicial to both the patient's welfare and to his life.

It is absolutely essential that any physician undertaking the administration of spinal anesthesia be thoroughly familiar with the anatomy of the spinal column and spinal cord, the origin of the various nerve roots from the spinal cord, and the distribution of these nerve roots

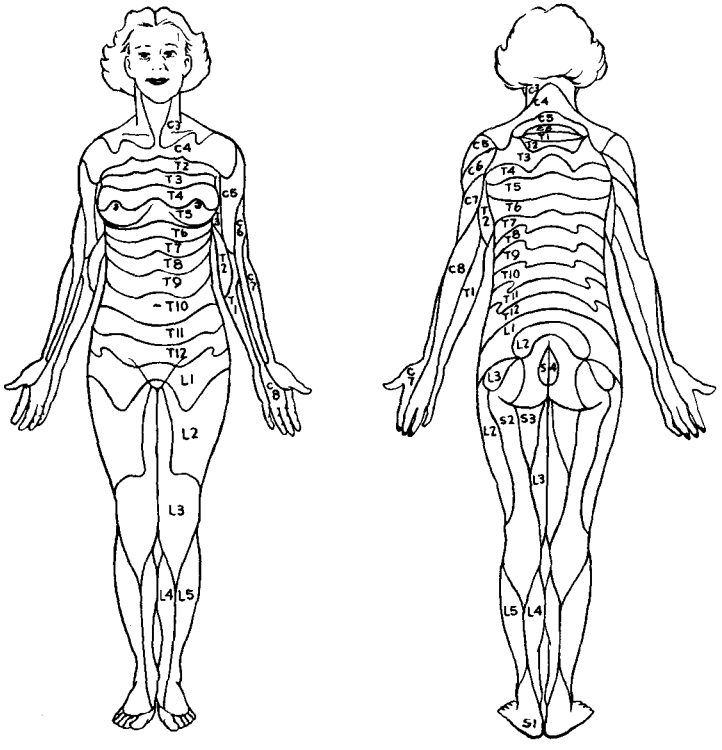

Figure 1. Skin representatives of distribution of somatic nerves. Notice that in posterior projection, skin anesthesia to interspace of L-4 is actually to L-1.

as peripheral nerves in relation to surgical problems (Figure 1). It is equally essential that he be familiar with the alterations that occur in vascular dynamics following interruption of the sympathetic nerve supply to a wide area of the body and know how to cope with these alterations. It is mandatory that the physician be able to manage patients with paralysis of part, or all, of the respiratory muscles. Spinal anesthesia should not be at-

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tempted by anyone who is not completely competent in the management of all types of general anesthetic techniques. In addition, the physician must be a practical psychologist in the management of patients under regional anesthesia.

The practices that are to be discussed have been proved safe in many thousands of cases and have been employed by many anesthesiologists. It will, unfortunately, not be possible to give credit to authors for every procedure discussed. Reference will be made, however, to specific articles when techniques or principles are mentioned and amplification or source documents seem to be desirable. In general, the older literature has not been referred to, since use of the bibliography following each chapter will open up a vast field for consideration.

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Chapter II

INDICATIONS FOR SPINAL ANESTHESIA

THE GENERAL indication for spinal anesthesia is for operations to be performed in the area of the body where innervation is supplied by the lower eight thoracic somatic nerves. The use of spinal anesthesia in operations on the gall bladder, stomach, kidney, spleen, etc., or what is more commonly called high spinal anesthesia with an anesthetic level to T4, should be reserved for patients with good respiratory function and circulatory reserve. For this reason, patients with emphysema or other chronic pulmonary diseases do not constitute suitable candidates for the utilization of high spinal anesthesia. In general, patients under forty years of age, or selected patients of greater age are most satisfactory for high spinal anesthesia. The age of forty is used as an arbitrary breaking point because patients over forty may be less tolerant to the possibility of myocardial ischemia. Since the tendency of blood pressure to fall increases with the height of the spinal anesthesia, it is necessary to judge carefully the capacity of the patient to tolerate reduced aortic blood pressure, and, as a corollary, reduced coronary blood flow.

Following is a general group of operations which may satisfactorily be performed under spinal anesthesia if the patient to whom the anesthesia is to be given is suitable, psychologically and physically.

1. Orthopedic procedures of the lower extremity, including the hip.

2. Rectal operations, including abdominal perineal resections.

3. Pelvic and lower abdominal operations.

4. Obstetrical procedures, including caesarean sections.

5. Genitourinary operation, including transurethral resections and bladder operations.

6. Endarteriotomies of pelvic and lower extremity arteries.

Spinal anesthesia may be employed in another group of surgical conditions, but a more rigorous selection of patients is indicated for this group.

1. Upper abdominal operations, including gall bladder and gastric procedures.

2. Operations on the kidney and spleen.

3. Neurosurgical operations, particularly those on the peripheral nerve of the lower extremity and procedures for a herniated nucleus pulposus.

Other uses for spinal anesthesia include:

1. Therapeutic procedures in types of heart disease with congestive failure.

2. Therapeutic and diagnostic procedures for vascular disease of the lower extremities.

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Chapter III

ADVANTAGES AND DISADVANTAGES OF SPINAL ANESTHESIA

SPINAL ANESTHESIA has several distinct advantages. *First,* it permits the use of extremely small doses of drugs which of themselves exert no metabolic disturbance within the body. The *second* advantage lies in the complete relaxation of skeletal muscles in the operative areas without necessity for total depression of the patient. The *third* advantage is that it constricts the bowel. The *fourth,* that a properly conducted spinal anesthesia affords considerable control as to the degree, duration, and extent of anesthesia. The *fifth,* spinal anesthesia permits a large variety of operations to be performed on patients who have a morbid fear of being put to sleep. While it is true that for many operations this fear cannot be considered, nevertheless, it may be a factor in some cases. The *sixth* advantage rests in its use for the aged. In the case of the elderly patient, spinal anesthesia may not only be practical, but desirable, especially in those instances in which the level of anesthesia needed does not involve the thoracic nerves, as in perineal operations or when it may be kept essentially unilateral, as in open reduction of fractures of the lower extremity, including the hip. It has been used in the best interests of the older patient in operations on the hip, in operations on the bifurcation of the aorta or arteries below for the removal of obstructions, and in abdominoperineal resections; however, its employment in these latter two examples requires the utmost care in blood pressure regulation.

DISADVANTAGES OF SPINAL ANESTHESIA

First, it should be remembered that many visceral sensations may be intact in patients under spinal anesthesia since the fibers mediating visceral sensations are carried through nerves which pass into the spinal cord between T5 and T12. Most of these sensations are mediated through the afferent fibers associated with the sympathetic nerves. The *second* disadvantage of spinal anesthesia rests in the fact that it is not generally applicable for operations on children. This does not mean that spinal anesthesia cannot be employed, or has not been so employed, but experience has shown that the average child is not a very satisfactory candidate for spinal anesthesia unless it is supplemented to a degree which would essentially remove many advantages of its application.

The possibility of complications which may be due to or attributed to spinal anesthesia can be considered a *third* disadvantage.

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Chapter IV

CONTRAINDICATIONS TO SPINAL ANESTHESIA

THE PRESENCE of specific contraindications may outweigh the advantages of spinal anesthesia. It is imperative that the possibility of contraindication be ascertained before the technique is employed. To do this, the problem of anesthesia must be discussed with the patient specifically. Some contraindications are relative and some are absolute, and their presence can only be discovered by physical examination and by medical and social history.

*1. **Refusal of Patient:*** Many patients have heard of, or have had experience with complications of spinal anesthesia, or conditions have arisen in the family or among friends which have been attributed to spinal anesthesia. Because of this, some patients develop a positive abhorrence to this type of anesthesia. While it is perfectly true that this attiude may be exaggerated or even unfounded, such an attitude on the part of the patient constitutes an *absolute contraindication to spinal anesthesia.*

*2. **Infection in or about the Lumbar Area:*** The presence of dermatitis, pustules, or cellulitis in the area of the lumbar tap constitutes an absolute contraindication to spinal anesthesia due to the possibility of transmitting the infection to the spinal fluid and thus producing meningitis. For this same reason, the presence of an old tuberculous osteomyelitis of the lumbar vertebrae is a contraindication.

*3. **Disease of the Central Nervous System:*** The pres-

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