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Published monthly by the
PHILADELPHIA COLLEGE OF OSTEOPATHY
48th and Spruce Streets, Philadelphia 39, Pa., U.S.A.
OSTEOPATHIC MEDICINE

The official publication of the Faculty of the Philadelphia College of Osteopathy

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OSTEOPATHIC MEDICINE is issued monthly, one volume of twelve issues being published each year. The subscription price is $4.00 per year, payable in advance. Single copies 50 cents.

Address all correspondence relating to business matters and subscriptions to Mr. Louis G. Schacterle. Address all other correspondence to Dr. Frederick A. Long. Both addresses 48th and Spruce Streets, Philadelphia 39, Pa.

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SOME INTIMATIONS OF AN OSTEOPATHIC BACKGROUND IN THE ETIOLOGY OF DISEASE, WITH SPECIAL REFERENCE TO THE MALIGNANCIES*

Otterbein Dressler

Professor of Pathology

All too frequently surgeons, radiologists, and others in the healing arts, including some pathologists, consider pathology, in their thinking, as dealing with disease as it exists. Fortunately, pathology comprehends something more than just the disease state in its fully developed form. Pathology is interested in the definition of disease and diseases, the etiology of disease, its pathogenesis, and many other related fields as well as the fully evolved process. The foregoing in defense of a paper by a pathologist dealing with the somewhat philosophical aspects of the etiology and pathogenesis of disease.

Point of view proves itself to be exceedingly important in science just as it does in theology or in the humanities. Our point of view concerning disease and its causes may decide the rational approach to the problems of disease or may lead into the blind alleys of dogma and empiricism. Fortunately for the human race it is becoming more and more evident that all the several schools of medicine are rapidly developing certain common points of view which, ultimately, if adhered to, will be to the greatest benefit of all. Divergence of point of view in the past has been responsible for the schism in the schools of medicine leading to sectarianism which is now so very difficult to overcome. In spite of its many disadvantages, however, sectarianism in medicine has in the aggregate served much good. Without sectarianism the healing arts might still be floundering about in Galenism.

From all the outward indications and intimations of sociology as practiced by human beings, by killing off all the biologically best, and by our earnest efforts to minister to the sick, it would seem that the objective of civilization is to perpetuate, if not indeed create, a race of biological inadequates. Certainly this is not the objective of the healing arts nor of the Osteopathic school of medicine in particular. Stated in its simplest terms the objective of medicine is and must be a biological system of therapeutics based upon the biological concept of disease.

To Hippocrates must go, by priority, credit for the first expression of this modern scientific point of view concerning disease. Hippocrates, more than twenty-five centuries ago said, "Consider the body as well as the disease." Such a simple statement is just as fundamental to our point of view concerning disease as the first axioms are to geometry or the

*The first Trenery Memorial Lecture given by invitation of the American Osteopathic College of Radiology at its convention in Philadelphia, October 23, 1943.
wheel or the pulley or the lever are to physics. It took many centuries
to evolve the steamship, the streamlined train, and the air transport from
these primitive and fundamental principles, but the principles remain
fundamental none the less.

Unfortunately the point of view of doctors, pseudo-scientists and
scientists shifted in the centuries following Hippocrates to the time of
Still culminating in a tremendous superstructure of drug therapy based
chiefly upon search for the panacea, considering the disease rather than
the body. It was Still who first concretely returned to the principle “Con­sider
the body as well as the disease,” paraphrased into “The rule of the
artery is supreme” and “The body manufactures the things within for the
cure of disease.” Still’s views were exceedingly radical in 1874 as judged
by the prevailing standards of that day; but as more and more study caused
disease to yield itself to scientific laws, more and more does the wisdom
of Still seem almost prophetic. Nor was that all, for Still also focused
attention on intrinsic causes of disease; indeed, he considered the body as
well as the disease.

Under the cold light of science disease is beginning to yield itself
not as a thing, not as a something, but as a process. There is nothing
biologically new in disease, no new processes are made, no new cells
are created. Processes may be accelerated, they may be perverted, they
may be slowed or they may be stopped but no new ones are added. The
cells of an exceedingly malignant tumor may appear quite different from
those familiar to the histologist, but they are none the less anaplastic
cells of the species of plant or animal involved. The pouch tumors, the
mixed tumors of the parotid, the toratomata of the testes, the chon­
dromata and others may appear very strange masses of cells, utterly pur­
poseless, but they have their counterparts in the evolution of the species.
Disease is, therefore, a biological phenomenon, no more to be wondered
at than other biological phenomena involving plants and animals. Again
our ideal must be a biological system of therapeutics, a system that will
enhance the body’s biological response to disease, a system that will con­sider
the body as well as the disease. Who cares by what name the system
might be known.

How much longer must we tolerate a system of surgery that has as
its weapon the excision of large masses of flesh for the treatment of
cancer of the breast with no attack upon the etiological agents? How
much longer will breasts be rapidly incised and excised for lobular hyper­
plasias and Schimmelbusch’s disease with little attention to the probable
pathology in the pelvis? These practices make of the surgeons what
Osler referred to as “The hewers of flesh and the drawers of blood.”
A new dawn is breaking; views are becoming more rational but we have
a long way still to go.

About the time that Still announced his new concept of disease, and
during the fifty years that followed, the world witnessed the most fruitful
period of investigation into the nature of disease. Indeed, President Taft
used to refer to the Spanish-American War as the medical war. In the earliest days of our school of medicine the bacterial hypothesis was struggling for existence against tremendous odds. Ultimately, dogma and empiricism had to give way to the truths of exotic disease. As bacterial diseases yielded themselves to bacteriological study, the body’s defenses yielded themselves to the science of immunology, a science translating the philosophical views of Still into tangible form. Now man is again considering the body as well as the disease and he has proved that the rule of the artery is supreme.

To the well-informed immunologist bacterial disease represents the biological response of the body to bacterial invasion. As so frequently happens in controversies, those embracing the cellular hypothesis of immunity and those supporting the chemical theory were both right. Both teach us that the immune reaction is something that springs from within the body, and rational therapeutics must be directed to the enhancement of this biological response.

Believe it or not, malaria is still the most important disease in the world. Believe also that quinine for the treatment of malaria has no substitute and there is nothing established as a superior remedy. The Rockefeller Foundation listed quinine as second only to rubber as one of our losses with the fall of Bataan. Withal, however, quinine does not cure malaria. Quinine may, and we hope it does, produce an unfavorable environment for the development and reproduction of malarial plasmodia, but the cure, the healing of the body, depends upon itself and is dependent upon how much damage has been done. More recently someone has suggested that the patient with malaria be permitted to pass through at least five paroxysms untreated in an effort to enhance his vital intrinsic immune reaction. At least the point of view is rational if immunity can be established.

Thousands of pages could be written to add to these examples and you will doubtlessly think of half a dozen for every one that I might mention but it is the point of view we are concerned about at the moment, “Consider the body as well as the disease,” “The rule of the artery is supreme.” Evolution has its forward and its backward swing. Slow as was the acceptance of the bacterial hypothesis, once established it soon came to be looked upon as the supreme answer to all questions about disease. All diseases might be bacterial. The average high school student, yes, even the pre-medical student of today, is led to believe that disease is the result of the invasion of the body by micro-organisms. It has been most difficult to create interest in the other half of the biological hypothesis of disease, to cause men to search for intrinsic causes of disease. Our particular school of medicine has been much criticized for even suggesting intrinsic etiology.

More and more we are ferreting out mechanisms of intrinsic etiology and pathogenesis. Indeed, much of the harm done the body in pulmonary tuberculosis is an effect of the body upon itself, allergy, rather than some
sinister diabolic action on the part of the tubercle bacillus. This same reasoning might be applied to other disease processes, particularly suppurative lesions where digestive enzymes get out of hand and digest more tissue than they need to for the defense of the body and living cells are destroyed as well as the dead.

The whole system of endocrinology is based upon intrinsic etiology and pathogenesis. There are few of the endocrinopathies that can be traced to extrinsic etiology and when they do involve an extrinsic factor, this factor is usually only one factor in a chain of causes.

There is a syndrome involving the female that has become so common that it has acquired a high nuisance value. The complaints of these women are most variable and not infrequently are attributed to a neurotic disposition. When the pelvic viscera are removed they present a monotonous uniformity of cellular change. The non-committal terms “chronic diffuse inflammation of the internal female genital organs” or “chronic peritoneal sclerosis,” or “chronic cystic ovarian sclerosis” have been frequently applied. More or less recently, Goodall has explained this syndrome along with endometriosis and its related conditions on the basis of ovarian hormonal disturbances. Here is a striking example of a considerable number of disease conditions previously thought to be exotic and now revealing themselves on the basis of intrinsic etiology and pathogenesis.

What we have just pointed out concerning chronic pelvic inflammatory disease of the female applies with equal significance in the history of VonRecklinghausen’s disease of bone, a disease thought to be inflammatory, perhaps exogenous, now well-established on an endogenous background of etiology. The metabolic form of arteriosclerosis, specifically atherosclerosis, was named and is still sometimes called chronic arteritis deformans suggesting an inflammatory rather than a metabolic disturbance.

Lastly, even the malignancies are beginning to yield themselves to an osteopathic concept of disease. In 1775 Sir Percival Pott noted that cancer of the skin was especially common in men who worked with tar and he suggested that tar acted in some way as a carcinogenic agent. However, it was not until 1915 that Yamagiwa put this hypothesis to the experimental test and by painting tar on a rabbit’s ear every day for six months was able to produce carcinoma at the site of the tarring. There can be no doubt that this was one of the greatest academic advances in the investigation of oncology. Now the dreaded lesions of malignancy might be reproduced more or less at will in experimental animals and, thus, the study of tumors was reduced to the same principles involved in the study of any other natural phenomenon, that of experimental production.

When a man strikes a match, creating fire, he is not explaining all the mysteries of combustion, he has only initiated a natural phenomenon by artificial means. When carcinogenic agents are applied to the skin and carcinoma results all that has been done is to stimulate or initiate a natural
phenomenon by artificial means. The fundamental intrinsic factor allowing for the development of a tumor has not been uncovered. Disillusioning as this statement might be, these still are the facts.

Maude Slye and others have shown by their breeding experiments that strains of mice can be made practically 100 per cent liable to developing malignancy, even of particular organs, while other strains are practically immune. Even if the extrinsic carcinogenic substances are applied to animals and to man the lesions do not develop in the absence of the yet uncovered intrinsic factors.

Champlain records the case of two brothers who were identical twins. One died of sarcoma of the right testicle at the age of 31 years. The other was struck upon the right testicle with a bar and shortly afterward developed sarcoma of that testicle from which he died at the age of 26 years. Had he escaped the injury he would have developed sarcoma of the testicle at the age of 31 years. There is no doubt concerning the importance of the extrinsic etiological factor, and it must be given due consideration, yet the facts are that the extrinsic factor was only a means, more or less artificial in nature, of precipitating the development of the tumor.

Warthin described a family in which there were three brothers who were very heavy smokers and died of cancer of the lip between the ages of 40 and 45. The fourth was a non-smoker and died of cancer at the age of 63 years. The smoking habit evidently was an extrinsic etiological factor in precipitating the development of the tumor but we have reason to believe that it would not have precipitated the development of the tumor if there had not already been present the intrinsic etiological factor.

Those who know the most about oncology are beginning to feel that the intrinsic factors in the production of tumors are, by and large, predominantly of the greatest importance whereas extrinsic factors are more or less coincidental.

Let us continue our thinking a little further concerning the carcinogenic agents. After it was discovered that painting the rabbit's ear with tar produced carcinoma it was thought that perhaps the tar considered by itself was not the etiological factor but some component of the tar. In 1932, Kennaway and Cook isolated a hydrocarbon, benzpyrene, from the tar and showed that it possessed a high carcinogenic power. By physicochemical analysis specifically with the analysis of the spectrum it was found that this hydrocarbon was related to certain synthetic hydrocarbons of which dibenzanthracene was a member. The latter substance possesses remarkably powerful carcinogenic properties.

These chemical investigations into carcinogenic agents have yielded the information that many carcinogenic chemical factors are common to animal bodies. Outstanding among these are cholic acid, the sterols such as cholesterol and the sex hormones. Oddly enough there is a striking reciprocal relationship between carcinogenic substances and sex hormones for benzpyrene may be used to replace the sex hormones. To those of us
assembled here tonight the relationship of the sex hormones to carcinoma of the breast and other carcinomata needs no defense because I am sure we are well aware of this relationship and its great significance. Yet, it would have been a most unfortunate circumstance if twenty years ago someone had suggested an intrinsic osteopathic etiology for the development of malignancies.

It is not the purpose of a paper, such as this, to state new facts but rather to develop our thinking along certain lines. In the sciences particularly it has been found desirable to have some set point, some constant about which to develop ideas and laws. Even the surveyor finds that he must repeatedly come back to some fixed point else he may find himself far afield. In American law it is hoped that we might be able to maintain a fixed point about which all things revolve and we hope that that fixed point will remain the Constitution of the United States.

The objective of a fixed point for the development of the healing art is not meant to re-establish dogma but rather to liberate our art from empiricism. If we can develop a point of view and interpret our evolution in reference to this point of view, I am persuaded we might find it very useful. The primary axiom in a rational study of disease has been often stated but just as often it has been deviated from with great hazards to mankind. There can be only one primary axiom and that is, “Disease is a biological phenomenon.” If we were to draw a corollary to this to guide us in our thinking and in our practice it would have to be to repeat the principle of Hippocrates and of Still, “Consider the body as well as the disease.”
RADIOGRAPHIC STUDY OF THE IMMEDIATE EFFECTS OF MOBILIZING MANIPULATION ON FLEXION-EXTENSION MOTION IN THE CERVICAL VERTEBRAL COLUMN

FREDERICK A. LONG  
Director of Research

PAUL T. LLOYD  
Professor of Radiology

and

C. HADDON SODEN  
Professor of Osteopathic Therapeutics

This paper will report on a continuation of studies begun in 1937 by two of us (Long and Lloyd) utilizing the roentgen ray in the investigation of vertebral mechanics.

A review of osteopathic literature covering the past two decades reveals that the motion range factor has been considered to be an important integral part of those abnormalities of spinal mechanics to which the term "osteopathic spinal lesion" has been applied. Tasker, Page, Becker, Castl6, Peckham, Soden, Schwab, McCole, Allen, MacDonald and Hargrave-Wilson, Fryette, Magoun, Beckwith, and Robuck have all indicated that to eliminate motion limitation in the vertebral column is one of the objectives of manipulation used for the correction of the spinal lesion. The idea would seem to be to restore "normal" motion ranges in segments of the spine in which "restricted" motion is present. The objective appears to be based on the assumption that in the spinal lesion restricted motion plays a large part in preventing operation of spinal mechanics normal for the individual. This assumption has rested upon theoretical grounds and upon estimation of motion range made by palpation. There would seem to be much room for speculation regarding the reliability of palpation alone as a means for evaluating vertebral segmental motion. The many variables inherent in palpation by a number of individuals as evidenced by the several interpretations frequently put upon examination of the same subject suggest the desirability of a method wherein correlation of palpation findings with those of a more objective method can be effected. We believe that the use of radiographic study offers much in this regard. At this point it should be pointed out that there are certain changes in the local tissues involved in abnormal spinal mechanics which can be determined best by the well-developed sense of touch. It is not with these that we are concerned in this paper, but only with motion range, which lends itself particularly well to measurement based on radiographic examination.
The present study was made to apply the roentgen technique developed and reported by two of us (Long and Lloyd)\textsuperscript{15} to the study of vertebral motion in the hope that it might develop more reliable data relative to changes in motion induced by manipulation than have accrued from palpation estimation alone. The technical factors reported originally were used for this series, and a review of the procedure recently has been published.\textsuperscript{16} This review should be referred to.

The purpose of the study to be reported here was to compare radio­graphically the flexion-extension motion present before and immediately after mobilization by manual manipulation in segments of the cervical vertebral column initially determined by palpation to be restricted in motion. The manipulative technique was applied to segments determined by palpation to be restricted in motion for the sole purpose of increasing the range of motion.

\textbf{Material and Procedure}

The subjects used for this study were fifty patients selected from the general clinic of the College. There were thirty-one females and nineteen males. The range in age was 15 to 53 years with a mean of 28.9 years. Patients were tentatively selected who, upon palpation, gave evidence of restricted motion in one or more of the second to sixth cervical vertebral segments. All spinal examinations were made by one of us (Soden). The results of this initial examination were immediately recorded on the osteogram. Films of the cervical column were made according to the technique previously referred to (v.s.). Wet film examination was made for evidence of any change contra-indicating the use of sudden mobilizing force. Being satisfied that no such contra-indication existed, a mobilizing type of manipulation was applied by one of us (Soden) to the segments determined by palpation to be restricted in motion. Immediately after manipulation, the segments were again palpated and the results recorded. A second set of films were then made.

The manipulative techniques employed were varied to the individual needs of each subject. All techniques were used bilaterally. There were two basic manipulations used, one in the supine position and one in the sitting, with some modifications in several instances. Mobilization was first attempted with all subjects in the supine position, but where this was unsuccessful manipulation with the subject in the sitting position was carried out.

The basic technique in the supine position, used in 13 subjects, was the following: The operator stood at the subject’s head and slightly to the right. One or several fingers of the operator’s right hand, depending on the number of segments to be mobilized, were placed lateral to the right inferior articular processes. The left hand was placed on the left side of the subject’s face. The head and cervical column were flexed, side­bent to the right and rotated to the left. Mobilization was attempted by
exaggerating the rotation tension to the left. The same procedure was carried out on the left side with the operator's hands reversed.

In 2 subjects traction in the supine position was used to produce mobilization. In 2 other subjects a technique in the lateral position was used.

In 28 subjects manipulation was carried out with the subject in the sitting position. In 22 of these, the sitting technique was resorted to after attempts at mobilization in the supine position had failed. The technique used in 25 of the 28 subjects was the following: The operator stood behind and to the right of the subject. The operator's right hand reached around the front of the subject's neck and the fingers of this hand were placed posterior to the inferior articular processes on the left side. The operator's left hand was placed on the right side of the subject's face. The head was side-bent to the left, rotated to the right, and slightly flexed. Mobilization was produced by maintaining side-bending of the head while the right hand executed a medial and upward thrust. In the remaining three subjects of this group the same technique was used but with the operator's left hand on the subject's left shoulder instead of on the right side of the face.

In 5 subjects a combination of the sitting and supine techniques was used, utilizing the basic technique for each position described above.

A series of control studies were made on fifteen male students with an average age of 22 years for the purpose of determining changes in cervical spinal mobility which might be incident to the changes in position occasioned by the radiographic examination procedure itself. An initial set of films was made, the subject walked from the film holder to a treatment table where he assumed the supine position for about three minutes (the approximate time consumed in carrying out mobilization in the subjects), he then walked back to the film holder and a second set of films were made.

The films in all instances, subjects and controls, were made in the sitting position upon a stool.

Results

Results will be given as changes occurring between vertebral bodies in flexion-extension movement based on alterations in lengths of the extended intersegmental vertical lines. By the method used it was not possible to insure that a given subject would flex and extend the cervical column exactly to the same degree before and after manipulation. Upon investigation of the total ranges of motion for the five segments studied it was found that after manipulation thirty-one subjects had increased in total range, eighteen had decreased, and one had remained unchanged. In order to determine net gain or loss of motion at any given segment, therefore, it was necessary to make correction based on differences in total
range. In all the results to be presented this correction has been made mathematically.

Changes in flexion-extension motion range following manipulation in segments initially determined by palpation to be restricted in motion and to which mobilizing force was applied are shown in table 1 and compared with segments palpated as normal in motion. Results in the control group are also shown. It will be seen that there was no significant difference between segments palpated restricted and mobilized, and those palpated normal and not receiving specific mobilizing force. In each group approximately half the number of segments increased in flexion-extension range of motion and approximately half decreased. The control group in whom no manipulation was carried out gave essentially the same type of reaction. The average percentage increases and decreases in the three groups of segments will be seen to have been essentially the same. It is of interest to note that the segments determined to be restricted by palpation and which were mobilized evidenced the least percentage increase value in addition to being 2.2 per cent less in incidence than the unrestricted segments.

The two contributory movements of neutral to flexion and neutral to extension positions were surveyed to determine whether in either instance there was significant deviation from the complete flexion to extension changes. The results are shown in table 2. The greatest variation in percentage incidence occurred in the neutral to extension movement where it will be seen that 8.3 per cent more of the unrestricted segments increased in motion following manipulation than of the restricted segments. These normal or unrestricted segments also evidenced the greatest average percentage increase.

The findings presented above had to do with segments determined to be restricted in motion by palpation examination. Further analysis was made of segments grouped according to the ranges of motion determined by x-ray examination previous to manipulation. As it was to the segments determined restricted by palpation that mobilizing manipulation was applied, it was only these segments which could be utilized for study of the effects of manipulation. The pre-mobilulative ranges of motion for these segments were determined and arranged into quartiles. In the first quartile were placed those segments evidencing the smallest ranges of motion and in the fourth quartile those with the greatest ranges as determined by x-ray examination. The results are shown in table 3. The greatest average increase and decrease both occurred in the second quartile, while the next to highest average increase occurred in the first quartile. The greatest number of increases and decreases occurred in the two middle quartiles.

In view of the fact that two manipulative procedures were used, one in the supine position and the other in the sitting, it was considered desirable to contrast the results of the two techniques. There were 65 subjects mobilized in the sitting position and 39 in the supine position.
TABLE 1

Changes in flexion to extension motion range in 50 manipulated subjects and in 15 controls. In the subject group 118 segments were initially recorded restricted (R) according to palpations and 132 segments recorded normal in motion range (N).

<table>
<thead>
<tr>
<th>Manipulated Subjects</th>
<th>Increased</th>
<th>Decreased</th>
<th>Unchanged</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no.</td>
<td>per cent</td>
<td>av. percentage change</td>
</tr>
<tr>
<td>R</td>
<td>60</td>
<td>50.8</td>
<td>11.1</td>
</tr>
<tr>
<td>N</td>
<td>70</td>
<td>53.0</td>
<td>12.8</td>
</tr>
<tr>
<td>Controls</td>
<td>34</td>
<td>45.3</td>
<td>11.8</td>
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### Table 2
Neutral to flexion and neutral to extension changes.

<table>
<thead>
<tr>
<th></th>
<th>Increased</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no.</td>
<td>per cent</td>
<td>av. percentage change</td>
</tr>
<tr>
<td>Neutral to</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexion</td>
<td>R</td>
<td>63</td>
<td>53.4</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>65</td>
<td>49.3</td>
</tr>
<tr>
<td>Neutral to</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extension</td>
<td>R</td>
<td>52</td>
<td>44.0</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>69</td>
<td>52.3</td>
</tr>
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</table>
TABLE 3

Changes following manipulation in segments mobilized arranged in quartiles according to range of motion initially determined by x-ray examination. Quartiles numbered according to increasing range.

<table>
<thead>
<tr>
<th>Quartiles according to range in mm.</th>
<th>Increased</th>
<th>Decreased</th>
<th>Unchanged</th>
</tr>
</thead>
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<tr>
<td></td>
<td>no.</td>
<td>average percentage change</td>
<td>no.</td>
</tr>
<tr>
<td>I</td>
<td>13</td>
<td>10.8</td>
<td>6</td>
</tr>
<tr>
<td>II</td>
<td>18</td>
<td>12.3</td>
<td>18</td>
</tr>
<tr>
<td>III</td>
<td>18</td>
<td>8.7</td>
<td>22</td>
</tr>
<tr>
<td>IV</td>
<td>11</td>
<td>6.8</td>
<td>10</td>
</tr>
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</table>

Results showing a comparison of the two techniques are given in table 4. It is at once obvious from the values shown that there was no significant difference between the two techniques so far as ability to increase motion range is concerned.

Summary

Fifty subjects were studied radiographically to determine changes in flexion-extension motion range in the second to sixth cervical vertebral segments following manual mobilization of segments determined by palpation examination to be restricted in motion.

Within the limits of materials and procedures used, manipulation was not effective in inducing significant increases in flexion-extension range of vertebral motion in the segments studied.

Comparison of two types of technique revealed no significant difference between them as regards the ability of each to increase vertebral motion range.

Bibliography

TABLE 4
Comparison of supine and sitting techniques.

<table>
<thead>
<tr>
<th>Technique</th>
<th>Increased</th>
<th></th>
<th></th>
<th>Decreased</th>
<th></th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>no.</td>
<td>per cent</td>
<td>av. percentage change</td>
<td>no.</td>
<td>per cent</td>
<td>av. percentage change</td>
<td>no.</td>
</tr>
<tr>
<td>Sitting (65)</td>
<td>32</td>
<td>49.2</td>
<td>10.6</td>
<td>32</td>
<td>49.2</td>
<td>9.2</td>
<td>1</td>
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<tr>
<td>Supine (39)</td>
<td>19</td>
<td>48.7</td>
<td>10.5</td>
<td>20</td>
<td>51.3</td>
<td>9.6</td>
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</tr>
</tbody>
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X-RAY STUDY OF SPINAL MOBILIZATION

PATHOLOGICO-RADIOLOGICAL CONFERENCE*

Paul T. Lloyd

Radiologist

and

Otterbein Dressler

Pathologist

Osteopathic Hospital of Philadelphia

Case 1

Clinical Data

Mrs. L. S. (16,521), a white female, said to be 41 years old, was admitted to the hospital May 1, 1944 complaining of nausea and vomiting. These symptoms were noted during the previous eight weeks but had become worse in the last three weeks prior to admission. Solid food was said to be the most offensive but nausea and vomiting were precipitated by the odor of food also. The dietary just prior to admission was said to have been two glasses of milk and some ice cream daily. The patient stated that she had lost twenty-three pounds in weight during the three weeks prior to admission.

The past personal history recorded attacks of measles, mumps, chicken pox, and typhoid fever in childhood. The tonsils were removed in 1937 (aged 34) and a Bartholin cyst was removed in 1940 (age 37). There was no history of any accident. The patient's mother was living and well; the father had died following cerebral hemorrhage at age 64.

There had been three conceptions with one abortion at the seventh week. Two term spontaneous deliveries were reported. There were no gynecological complaints.

Dyspnea was complained of as was also tinnitus aurium.

Contracted musculature was noted about the cervical spine.

Upon admission routine urinalysis revealed no striking changes except some increase in quantity of indican. Routine studies of blood showed hemoglobin, 11 grams per cent (80.3 per cent); color index, 0.9; erythrocytes, 4,450,000 per cu. mm.; leucocytes, 7,200 per cu. mm.; lymphocytes, 2,016 per cu. mm. (28 per cent); polymorphonuclears, 5,040 per cu. mm. (70 per cent); eosinophiles, 72 per cu. mm. (1 per cent); basophiles, 72 per cu. mm. (1 per cent). Mild anisocytosis and a few poikelocytes were demonstrated. Serological studies were negative for syphilis by the complement fixation method of Kolmer and the precipitation method of Kahn. The blood was type “0” Lansteiner. Fractional gastric analysis presented a low normal curve with blood in the gastric juice.

* For the Resident Staff of the Hospital.
Roentgenological Data

Gallbladder: Preliminary survey films of the gallbladder were negative for liver enlargement and gross evidence of calcified gallstones. The colon contained barium from gastro-intestinal examination made elsewhere prior to admission to the hospital. Cholecystograms made at the 15 hour period showed a visualized gallbladder, larger than average, occupying an average position to the liver and showing a homogenous density and a smooth regular contour. Postprandial films secured after the administration of Cholestim showed a sharp reduction in the size of the gallbladder with elimination of considerable opaque bile. The gallbladder shadow was disturbed as to homogeneity due to gas in the overlying intestine. Conclusion: Visualized gallbladder, larger than average and showing a satisfactory degree of functional activity to test meal and negative for direct or indirect evidences of cholelithiasis.

Esophagus: Negative to filling defect but showed some widening and ectasia, extending upward from the diaphragmatic level.

Stomach and duodenum: The left leaflet of the diaphragm showed an appreciable elevation. The cardia of the stomach closely approximated the elevated diaphragmatic leaflet; and with the patient standing, a large collection of gas and gastric secretion could be located to the high-lying cardia. The esophageal hiatus was located well below the visualized cardia and barium when entering the stomach formed a fluid level below the secretion level and superimposed gas in the cardia. In order to place opaque media in the cardia of the stomach it was necessary for the patient to be supine, thus allowing the barium to gravitate upward into the cardia. In lateral position the cardia of the stomach was markedly enlarged and extended from before backwards to follow almost entirely the contour of the left hemidiaphragm. Gastric peristalsis was visualized throughout the receptive portion of the corpus. Peristalsis extended to the pylorus. The cap was visualized and showed no defect. The duodenum was enlarged as to caliber, showed altered mucosal pattern and altered physiology. These changes in the duodenum extended from the first portion throughout the duodenum as far as the proximal jejunum. At this latter site the intestinal coils were confused and matted, and could be separated readily by direct palpation. No tumor masses could be felt at direct palpation over the gastric, duodenal, or mesenteric regions.

Five hour examination showed gastric residuum approximately 10 to 15 per cent with a heavy residuum of barium in the dilated, altered duodenum. In the film made at this time the duodenum at the duodenojejunal junction showed a defect most suggestive of an intussusception. The terminal ileum showed widening and increased luminal caliber with altered physiology. Palpatory examination elicited tenderness over the lower right quadrant, and also along the course of the duodenum and again at the duodenojejunal junction.
An erect film at this time showed the gallbladder to be enlarged and containing opaque bile.

A twenty-four hour film of the intestinal tract showed a small residuum of barium in the stomach and again a heavy residuum of barium in the duodenum, intestine, and even in the terminal ileum. A small, tortuous, though rather long appendical lumen was visualized. The barium in the descending colon tended to collect in scybalous masses.

**Opinion:** Eventration of the left diaphragm affecting and altering the anatomy of the stomach insofar as the cardia and proximal corpus was concerned. The enlarged cardia served as a reservoir and tended to retain secretion, food, and gas. The elevation of the diaphragm and stomach tended to alter the anatomic location of the esophagogastric junction, probably producing, by altered mechanics, the ectasia of the esophagus.

Obstruction, dilatation, and delayed motility characterized the duodenum throughout. The obstructive site was located to the region of the proximal jejunum, close upon the duodenojejunal junction. It is believed that this obstructive mechanism was probably due to congenital "veils" or bands and that at this site there was probably recurrent intussusception of the duodenum. The obstructive mechanism was productive of protracted duodenal stasis. There appeared to be dilatation of the distal ileal loops with delayed motility present. The exact demonstration of pathology in the lower right quadrant was not established at the time and the need for more complete investigation was suggested.

Consideration in this case was given to the possibility of intrinsic neoplasm of the jejunum and this was called to the attention of the surgeon prior to operation. It was also felt that neoplasm might contribute to the production of intussusception and thus account for a previous complaint, characterized by sudden onset of pain, nausea, and vomiting two years prior to the present illness and reported by the patient to the radiologist during examination.

Consultation was secured in this case and the consultant agreed in the radiological diagnosis offered.

**Pathological Data**

On May 12, 1944, under spinal anaesthesia 5 cm. of jejunum and a mass from the omentum were removed. The following were the pathological findings. (SP-44-10,677): **Macroscopy**—Five and one-half centimeters of small intestines was submitted presenting an annular tumor 3 cm. in length. There was a scant 1 cm. of uninvolved intestine at one end of the specimen.

A portion of fatty tissue resembling mesentery or omentum was identified containing a large nodule of firm tissue having all the gross characters of carcinoma.
Microscopy—Sections of the intestines show, in one portion, layers of hyperplastic mucous membrane merging into a neoplasm of anaplastic epithelium of glandular type. This neoplasm is somewhat papillary in architecture, it is very distinctly invasive and has violated all the layers of the intestines with some cells coming to lie in the serosa. One would fear that some of these cells have dropped into the peritoneal cavity so that recurrence might be anticipated.

Sections of the portion of omentum referred to above show a great overgrowth of newly-formed fibrous connective tissue stimulated evidently in a vain attempt to halt the progress of extension of the malignant tumor referred to above. Throughout this tissue there are islands of grotesque glandular structures quite similar to those of the primary neoplasm described above. We have every reason to believe that this represents direct extension of the malignant lesion of the intestine. Here and there there is some necrosis involving the fat cells.

RADIOLOGICAL DIAGNOSIS: Duodenal obstruction due to intussusception of recurrent form.

PATHOLOGICAL DIAGNOSIS: Adenocarcinoma of the intestine. Metastatic carcinoma of the omentum.

Case II

Clinical Data

Miss C. P. (16,299), a white female youngster, said to be 10 years old, was admitted to the hospital April 2, 1944 with a chief complaint of “pain in both legs.”

The pain in the legs was said to have begun six months previous to the time of admission. On its first appearance the pain began spontaneously during the night awakening the child from her sleep and soon disappeared. These episodes were repeated on several successive nights but there was no pain during the daytime. The pain was described as aching in character and intermittent, with the attacks occupying about one hour. Prior to admission the pain is said to have become more severe and almost continuous, and the child had been awakened by “night cries.”

Ten months prior to admission the child complained of “stiffness of the back” following trauma produced by bumping against a radiator. Nine months prior to admission the child is said to have fallen from a swing, fracturing the coccyx. The record would indicate that the fracture was not demonstrated until three or four weeks after the latter accident. At this latter time hospitalization evidently had been resorted to for relief of pain. Following the period of hospitalization the patient continued to evidence pain with no improvement and was admitted to several hospitals on different occasions. Weight loss of twenty pounds was described in the seven months prior to admission to this hospital.

The child’s previous health record was described as quite good. There
had been attacks of chicken pox and measles. There had been no opera-
tions and no accidents except those noted above.

The mother and father of the child were alive and evidently well
at the time of this admission. Their ages were, respectively, 38 and 41.
There were two brothers living and well but their ages were not given.

The child evidenced a lack of interest in food with no symptoms of
discomfort from foods, but constipation was present.

Pain in the thorax was complained of when crying.

Upon admission to this hospital the urine presented nothing signifi-
cant. Routine hematological studies showed hemoglobin ten grams per
cent (73 per cent); color index, 0.8; erythrocytes, 4,530,000 per cu. mm.;
leucocytes, 16,800 per cu. mm.; lymphocytes, 4,704 (28 per cent); poly-
morphonuclear neutrophilic leucocytes, 12,096 (72 per cent). There were
no abnormal cells found in the smears.

Serological tests on blood were negative for syphilis by complement
fixation (Kolmer) and precipitation (Kahn). Blood sedimentation by
the method of Cutler demonstrated a sedimentation time of 20 minutes and
a sedimentation index of 28 millimeters in one hour.

Vollmer patch tests presented a reaction negative for tuberculosis.
During the child’s stay in the hospital an attack of otitis media was ex-
perienced and cultures of the discharges from the right and left auditory
canals showed the presence of staphylococci and streptococci in a hemo-
lytic flora.

Palpation through the rectum disclosed a mass between the rectum
and sacrum. This mass was described as being six centimeters in lateral
diameter but the superior border could not be reached by the palpating
finger. The mass was fixed in its position.

Neurological consultation reported a diagnostic impression of “A new
growth, the upper level of which is at the second lumbar segment of the
cord.”

A light diet was allowed but manipulative treatment was interdicted.
Contracted muscles were described along the spine from occiput to sacrum.

Radiological Data

X-ray examination of the lumbar spine and pelvis made April 3, 1944
and again April 5 with examination of the chest carried out April 7,
revealed the following.

At this time the lumbar spine in itself appeared to be essentially
negative. There was, however, undoubted evidence of pathology in the
sacrum affecting the second, third, and fourth sacral vertebrae, with pos-
sibly some minor extension into the fifth sacral segment. The changes
seen in the sacrum concerned decreased radio density of bone with resorp-
tion apparent, most marked involvement being in the third and fourth
sacral segments, where erosion of bone was apparent in the bodies of the
sacral vertebrae with also widening and enlargement of the sacral foramina on the left side. Overshadowing the sacrum there appeared to be soft tissue reaction, probably in the form of tumor. This soft parts change was approximately 6.5 cm. to 7.0 cm. in diameter and was located chiefly in front of the lower three sacral vertebrae. The coccyx showed a rather poor degree of anatomic development and may have been involved in the above pathologic process.

Examination of the chest showed undoubted evidence of metastatic malignant disease expressed in terms of multiple opacities in the lower one-half of each lung. A large metastatic lesion is seen to be located to the left hilum, projecting itself downward and outward to overshadow and extend beyond the left heart margin. All of the metastatic foci demonstrated favor a large, somewhat bulky size.

**Opinion:** Sacral tumor involving the lower three or four sacral vertebrae. The tumor assumes resorptive or destructive proportions with maximum neoplastic effect demonstrated in the third and fourth sacral segments. The changes in the left sacral foramina and in the sacral bone generally are of an erosive or pressure deforming type, indicating quite strongly the probability of neurogenic lesion. That the tumor is malignant is borne out by the presence of multiple metastatic foci in both lungs.

Consideration was given to the following neoplasms: Neuroblastoma, neurogenic sarcoma, and sacral teratoma. It was felt that chordoma, lymphadenoma, endothelial myeloma, and tuberculosis could be eliminated. Neurogenic tumor was favored.

**Pathological Data**

On April 14 a biopsy of the mass over the sacrum was performed and tissues were examined as follows (SP-44-10,557): **Macroscopy**—The specimen submitted consisted of six slides of bloody fluid and two very small, irregular bloody fragments of tissue.

**Microscopy**—Sections of the material submitted show a considerable amount of bloody debris with exceedingly small fragments of tissue. These tissue elements are highly cellular, made up for the most part of very small cells, some of which are rounded, others somewhat elongated. Some of these small cells are quite distinctly pear-shaped and while we do not have enough material for special staining processes, we get the distinct impression that these cells have a tendency to the development of fibrils about their extremities. We have not been able, to our satisfaction, to demonstrate a stroma effect between the cells nor are there suggestions in these sections of great vascularity though there is considerable interstitial hemorrhage. In certain areas the cytological elements are somewhat larger than those just described, paler in staining and somewhat polyhedral in shape with comparatively large nuclei with prominent nucleoli.
After an examination of these materials at considerable length we find great difficulty in becoming satisfied as to the diagnosis. Some thought has been given to the possibility of an osteogenic sarcoma because of the clinical syndrome. We believe this is satisfactorily ruled out by the study of these sections. From the roentgen evidence one would be led to believe that this tumor has had its origin from the spinal cord, its extension or its membranes. We have given thought to the possibility of a sarcoma but it is our feeling that neither the vascularity nor the stroma supports this possibility. It is our impression that this tumor is truly neurological and neurogenic. In some respects it has the characters of an astrocytoma. We do not find any of the characters to suggest an ependymoma. In spite of its somewhat unusual location it would be our strongest impression that this mass probably is a highly cellular embryonal neurocytoma. We do not believe that it constitutes a cordoma, among other reasons because of the fact that there has been such early and widespread metastasis. There is no doubt that this tumor is highly malignant.

RADIOLOGICAL DIAGNOSIS: Malignant neurogenic tumor of the sacrum with metastases to both lungs.

PATHOLOGICAL DIAGNOSIS: Probable embryonic neuroblastoma.

The patient is now receiving roentgen irradiation under the high voltage tube and with the treatment cycle nearing completion there can now be demonstrated striking improvement in the patient's clinical condition together with an equally pleasing response to treatment in both the sacral tumor and the metastatic secondary lung lesions.

Note: This case will again be presented at conference during the follow-up period.
SPONTANEOUS RUPTURE OF THE AORTA DUE TO SYPHILIS: AUTOPSY REPORT OF A CASE*

Otterbein Dressler
Professor of Pathology in the College and Special Deputy Coroner
City of Philadelphia

Syphilis has a striking predilection for the aorta, though clinical statistics do not seem to evidence as frequent occurrence as autopsy findings. In effect, the lesion is "syphilitic mesoaortitis." The term mesoaortitis is remarkably descriptive because the lesion is primarily an inflammatory and destructive disease of the supporting media of the aorta. This more or less local destruction of supporting layers accounts for the development of aneurisms. Sometimes, as in the case to be reported, rupture of the aorta succeeds. If rupture of the aorta occurs outside the pericardial sac, loss of blood will account for the death of the individual. In the case to be presented, rupture occurred within the pericardial sac. The accumulation of blood in the pericardial sac interrupted cardiac physiology by tamponade. Thus, sudden death was inevitable.

Clinical Data

"The deceased was found in the bathroom by his landlady, who said he was dressed to go to work. His draft classification was 4F. The police took him to the hospital and he was dead on arrival. There were no suspicious circumstances present."

External Examination

The body was that of a thin, negroid male, said to be 34 years old. His length was 71.5 inches and his weight estimated at 135 pounds. There was a sparse growth of hair on the scalp. The pupils were equal in size. Teeth and mouth were in a foul state from lack of oral hygiene. Phimosis was noted and a cicatrix having the gross characteristic of a healed chancre was demonstrated at the base of the shaft of the penis on its under surface adjacent to the perineum.

The left forearm presented a tatoo mark "AL." The lower extremities were elongated out of proportion to the trunk.

There were no evidences of gross trauma and no suggestions of caustic poisoning.

Internal Examination

The pericardial sac contained 200 cc. of free bloody fluid. A very large blood clot made a mold of the heart as if poured of red gelatin. This

*Case presented through the courtesy of Dr. Benjamin Gouley, Chief Coroner's Physician, City of Philadelphia.
blood clot would have amounted to several hundred cubic centimeters of blood. A pouting perforation of the first portion of the aorta anteriorly accounted for this hemorrhage. The heart measured 12 x 7 x 6 cm. The first portion of the aorta had all the characteristics of syphilis with perforation. Postmortem serological examinations of the blood presented positive reactions for syphilis by the complement fixation method of Kolmer and the precipitation method of Kahn.

The esophagus presented no noteworthy lesions.

The stomach presented no lesions and contained no food. There was no odor of alcohol. The intestines were found lying in a very low position in the lower abdomen and pelvis. The colon was overloaded with fecal matter and it is likely that straining at stool might have been a factor in this death. The liver contained pale, nodular structures having the gross characteristics of gumma. The gallbladder emptied under considerable pressure.

The pancreas presented no noteworthy lesions.

The spleen measured 15 x 7 x 3 cm. and presented nodules suggestive of gumma.

The prostate was small.

The kidneys measured respectively, right and left, 11 x 7 x 3 cm. and 12 x 7 x 4 cm. Fetal lobulation was evident but the capsules stripped with ease. The ureters were not dilated.

The suprarenal glands presented no noteworthy lesions.

Anatomical Diagnosis

Syphilitic aortitis
Ruptured aorta
Hemopericardium

Cause of Death

Ruptured aorta, due to syphilitic aortitis.

Summary

The autopsy protocol of a case in which there was spontaneous rupture of the aorta is presented.

Spontaneous rupture of the aorta was due to syphilis.

Tamponade of the heart had occurred.

Postmortem serological studies presented positive reactions for syphilis by the complement fixation method of Kolmer and the precipitation method of Kahn.
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