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SHORTENING OF LIMBS

AFTER FRACTURE.

BY

LEWIS A. SAYRE, M.D.

*Reprinted from THE MEDICAL RECORD, April 16, 1881.*

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201-213 EAST 12TH STREET.

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## SHORTENING OF LIMBS AFTER FRACTURE.

TO THE EDITOR OF THE MEDICAL RECORD.

SIR—Prof. Frank H. Hamilton, in the sixth and last edition of his work on “Fractures and Dislocations,” recently issued by Henry C. Lea & Co., of Philadelphia, has made so many misstatements in regard to myself, and has repeated them so frequently in his book, that justice to myself and the profession demands that I should expose them.

From the teachings of Prof. Hamilton and from his published works, the general impression among the profession, and certainly in my own mind was, that in *all* cases of oblique fracture of the thigh in a healthy adult, *shortening* was the *inevitable result*; in other words, that *no* case of oblique fracture, such as I have described, *could* recover with the *normal length* of the limb. To show that this impression was the result of his teaching, and was the only possible interpretation that could be given to his language, I refer to a work entitled “Deformities after Fracture,” published in 1857, by Frank Hastings Hamilton, M.D. On page 74 we find the following: “In conclusion, I wish to say briefly, that in view of all the testimony which is now before me, I am convinced, first, that in the case of an oblique fracture of the shaft of the femur occurring in an adult whose muscles are not paralyzed, but offer the ordinary resistance to extension and counter-extension, and where the ends of the broken bone have once been completely displaced, *no means have yet been devised by which*

*an overlapping and consequent shortening can be prevented.*"\*

Having seen quite a number of fractured thighs in very vigorous muscular adults, some of which had united *without any shortening*, that could be detected by the most careful measurement, I took the liberty of doubting Dr. Hamilton's law, and in my "Report on Fractures," made to the American Medical Association in Detroit, in 1874, I said among other things: "Fractures of the long bones require that *extension and counter-extension under chloroform*, or other anæsthetic, if necessary, should be made in a *proper direction*, until perfect accuracy of adjustment is obtained, and after this, *retention and fixation in this normal condition until consolidation*. By *accuracy of adjustment* I mean the perfectly normal condition of the bone as to length and position. When the extension and counter-extension have been properly made, the muscles and other tissues surrounding the bones will necessarily and positively force the fractured extremities into their natural position, as above described, unless some foreign body, as a shred of muscle or connective tissue, has got between the fragments.

"All extension beyond this point of perfect accuracy of adjustment is unnecessary and injurious; for, being abnormal, it excites reflex contractions. Hence the objection to continued extension, which keeps up reflex irritation, or else by paralyzing the muscles allows of elongation, and consequently, frequently results in non-union.

"All extension short of that necessary to this perfect adjustment is insufficient, leaving the extremities of the bone as sources of irritation, and causing pain and muscular contractions as well as leaving the vessels in a looped or zig-zag position, causing the œdema heretofore described.

"The nerves also, being in an abnormal position, are additional sources of irritation. If the bone (whatever bone it may be) is thus placed and can be retained in its normal position, the patient is free

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\* The italics are mine.

from pain, and all the functions of the limb (except walking) are as well performed as in cases of simple fracture, and the recovery in a healthy constitution will be as perfect and complete, with normal length, without deformity, as if no fracture had occurred. If the limb has been extended to its normal length, the bones must necessarily be accurately adjusted by the surrounding tissues. *If this position, therefore, can be positively maintained, shortening cannot by any means take place, but rather a lengthening to the extent of the plastic material effused between the bones that joins the fractured extremities.*"

I concluded my report by saying, "the plan that has been here briefly sketched I believe to be of universal application, and the surgeon *who can most accurately put it into actual practice* will have the best results in the treatment of fractures."

This doctrine I still maintain and most firmly believe; not that we can *always* obtain perfect results, for it is frequently impossible to make a perfect application of the principles above laid down; but the nearer we can approach to their perfect application the better will be our results.

I supplemented my report by adding the statistics of fractures treated by plaster-of-Paris, in Bellevue Hospital, in 1872 and 1873, tabulated and arranged by Dr. G. A. Van Wagenen, in which table there appeared four cases of fracture of the thigh that had recovered *without any shortening*. When the accuracy of the measurements was called in question, I made the following reply, which I copy from the "Transactions of the American Medical Association" for 1874, page 232. "Dr. Sayre was glad that he had provoked this animated discussion. He had been misunderstood. He had made a report showing the results of his treatment in a very favorable light, but he *knew* the statistics to be absolutely and positively true. They had been drawn up chiefly by Dr. Van Wagenen, of Bellevue Hospital, in whose reliability he had the utmost confidence. Many of the measurements were made by Prof. Frank Hamilton, who, until recently at least, did not believe that

union of fractured bones could occur without shortening.

“Dr. Hamilton, along with Dr. Sands, had made a personal examination of the cases in his (Sayre’s) wards. Dr. Hamilton acknowledged that there were some cases in which he could find no shortening, and had stated that if he could bring seven consecutive cases together he would admit the principle.\* Dr. Gregory, of Missouri, had yesterday asserted, and to-day repeats it, that it was impossible for union to occur without shortening. This, and the fact that recently cases had come under his notice, when the bones were not replaced for nine days, had determined him on appearing here, whereas some time ago he had deemed it unnecessary, supposing the matter had been fully brought before the profession by Drs. St. John, Crosby, and Bryant. When he considered that at this day there were some men who still waited for the swelling of the soft parts to subside before adjustment, he thought there were some men in the profession needing instruction in the treatment of fractures.”

Let us now see how Dr. Hamilton interprets this reply. On page 437 of his new work he says: “Attention has already been called, in the chapter on General Prognosis, to the published statements of Dr. Sayre relating to this subject; but it will be necessary to note again in this place that he asserts that all fractures of the femur may be made to unite without shortening,† and to add that in proof of the latter assertion, Dr. Sayre, at the meeting of the American Medical Association, in Detroit, Michigan, in 1874, declared, when the accuracy of his measurements was called in question by some of the gentlemen present, that he knew his measurements were correct, that Dr. Frank Hamilton had made the measurements, and that he was a man who was so

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\* I was told these facts by some members of the house staff, who said they had asked Dr. Hamilton to make the measurements as I had requested. The subjoined letters will prove conclusively that I was perfectly authorized to make the statement.

† No such assertion can be found in anything I ever wrote, and I never made such an assertion orally.



violently opposed to the theory, that, in his published writings, he had denied the possibility of any oblique fracture being cured without shortening. For this reason he (Dr. S.) had asked him to measure the patients.\* He said if seven successive cases would be presented, he would agree to give up his opposition to the theory. He found the cases and surrendered." He continues: "I was not present when these statements were made, but in the following number of the same journal in which they first appeared, I called attention to their untruthfulness,† and I will now repeat that I have never said, in any of my published writings or elsewhere, that it was impossible that any oblique fracture of the femur could be cured without shortening, and I never entertained such an opinion." (I here refer to Hamilton on "Deformities after Fracture," published in 1857, page 74, for a complete refutation of this assertion.) "Further, I am obliged to say that no such conversation as that related by him ever occurred between us, and that I never measured or saw the cases mentioned by him.‡ It is difficult for me to conceive, therefore, how this gentleman has fallen into these errors; and I confess I would have been very much gratified if—his attention having been repeatedly and publicly, through the medical journals, called to the matter—he had made some such public explanation or denial as would have rendered it unnecessary for me to allude to it in this place."

I never related any such conversation as having occurred between Dr. Hamilton and myself, and I have just carefully read the report of the transactions of the American Medical Association, and find no mention of such a conversation. As to the concluding sentence, "that he never measured or saw the

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\* This statement is absolutely false, as will be seen by reference to the published Transactions of the American Medical Association for 1874, page 232, where it will be seen that I made no such statement as here quoted.

† I never saw the journal referred to, and cannot be held responsible for what is said in different medical journals. I appeal to the official records of the society, and nothing of the kind will be found recorded there.

‡ The italics are mine.

cases mentioned," I refer to the annexed letters of Drs. Van Wagenen, Burchard, St. John, Bryant, and Fluehrer, to prove that he did make these measurements in their presence. I never saw in any medical journal any allusion made to me on this subject by Dr. Hamilton, except his letter published in the *MEDICAL RECORD*, June 1, 1874, page 363, and to which I replied immediately, and which reply was published in the *RECORD* August 1, 1874, page 414. As some gentlemen may not be so fortunate as to have files of the *MEDICAL RECORD* to refer to, I here republish them, in order to show that I did make a public explanation as soon as my attention was called to the subject by Dr. Hamilton.

Extract from *MEDICAL RECORD* June 1, 1874 :

"SHORTENING OF LIMBS AFTER FRACTURE.

"TO THE EDITOR OF THE *MEDICAL RECORD*.

"SIR—My friend and colleague, Dr. Sayre, in a clinical lecture on 'Un-united Fractures,' is reported in the *MEDICAL RECORD* of May 1, 1874, as having said, 'The law, however, that shortening must necessarily attend the union of a fractured bone is incorrect, as can be satisfactorily proved by practical demonstration. Now you will see the impotence of the law laid down, that shortening must always take place if union is effected.'

"I am not aware that any one has ever laid down a law of this kind. If any one has, he has rendered himself a proper subject of ridicule. Believing, however, that Dr. Sayre has been reported incorrectly, or that in an oral lecture he has spoken inadvertently, I wish to call his attention to the paragraphs above quoted, and ask him how they are to be understood.

"FRANK H. HAMILTON.

The following reply was published in the *RECORD*, August 1, 1874, page 414 :

“SHORTENING OF LIMBS AFTER FRACTURE.

“TO THE EDITOR OF THE MEDICAL RECORD.

“SIR—In the RECORD of June 1, 1874, is a letter from my friend and colleague, Dr. Frank H. Hamilton, criticising my remarks on ‘Fractures,’ as published in the RECORD of May 1, 1874, wherein I said: ‘The law, however, that shortening must necessarily attend the union of a fractured bone, is incorrect, as can be satisfactorily proved by practical demonstration.’ Dr. Hamilton says in his note of June 1st: ‘I am not aware that any one has ever laid down a law of this kind. If any one has, he has rendered himself a proper subject of ridicule. Believing, however, that Dr. Sayre has been incorrectly reported, or that in an oral lecture he has spoken inadvertently, I wish to call his attention to the paragraphs above quoted, and ask him how they are to be understood.’

“In explanation, I would say, first, that I did not speak inadvertently, nor was I incorrectly reported. On the contrary, Dr. Carpenter, who reported my lecture, is one of the most accurate medical reporters I have ever known. I make no pretension to having cured *all* of my cases of fracture without shortening, but know that many of them have been thus cured; and believing that a student will make a better result if he *tries* for perfection (although he may not attain it), than if he commences to treat a case of fracture with the belief that it must recover with shortening, I *tried* to impress them with the importance of trying for perfection.

“That this belief in shortening after fractures is quite general I am confident, from the number of physicians and students who have spoken to me on the subject, and from the discussion on fractures at the recent meeting of the American Medical Association in Detroit, where Drs. Hodgen, Gregory, and others stated that ‘*reunion of a fractured bone without shortening was impossible,*’ and most of these persons referred to Dr. Hamilton as their authority for this belief.\* I am therefore delighted to know that

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\* See Transactions of the American Medical Association for 1874, page 228 et seq.

they cannot quote him in future in order to sustain this erroneous doctrine.

“I presume they have, like myself, inferred that Dr. Hamilton did not believe in the possibility of an oblique fracture of a long bone uniting without shortening, from reading his published works, and that the inference was a correct one. I quote from page 74 of a work entitled, ‘Deformities after Fractures,’ published in 1857 by Frank Hastings Hamilton, M.D. He says: ‘In conclusion I wish to state briefly that, in view of all the testimony which is now before me, I am convinced :

“ ‘*First.*—That in the case of an oblique fracture of the shaft of the femur, occurring in an adult whose muscles are not paralyzed, but offer the ordinary resistance to extension and counter-extension, and where the ends of the broken bones have once been completely displaced, *no means have yet been devised by which an overlapping and consequent shortening can be prevented.*\*

“ ‘*Second.*—That in a similar fracture occurring in children, or in persons under fifteen years of age, the bones may sometimes be made to unite with so little shortening that it cannot be detected by measurement; but whether in such cases there is in fact no shortening, since, with children especially, it is exceedingly difficult to measure very accurately, I cannot say.

“ ‘*Third.*—That in transverse fractures, or oblique and denticulated, occurring in adults, and in which the broken fragments have become completely displaced, it will be generally found equally impossible to prevent shortening, because it will be found to be generally impossible to bring the broken ends again into such apposition as that they will rest upon and support each other.

“ ‘*Fourth.*—That in all fractures, whether occurring in adults or in children, where the fragments have never been completely or at all displaced, constituting a very small proportion of the whole number of

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\* The italics are mine.

these fractures, a union without shortening may always be expected.

“ ‘*Fifth.*—That when, in consequence of displacement, an overlapping occurs, the average shortening in simple fractures, where the *best appliances* and the *utmost skill* have been employed, is between one-half and three-quarters of an inch.’

“ ‘From these quotations I think the reader must be satisfied the inference drawn by others as well as myself, that Dr. Hamilton believed in shortening after fracture, was justifiable. I am, however, delighted to know that I did not understand his writings correctly, and that he agrees with me that shortening after fractures is not an absolute necessity, for he says, ‘If any one has ever laid down such a law, he is a proper subject of ridicule.’

“LEWIS A. SAYRE.

“ July 1, 1874.”

It will be thus seen that I did make a proper reply to Dr. Hamilton as soon as my attention was called to the subject by him, and therefore he had no excuse for referring to it in a work professing to be a text-book for students.

On page 439 he says: “Sayre, who formerly used the double or triple inclined plane, or flexed position, has of late adopted the straight position, with plaster-of-Paris, and with both alike claims to have made only *perfect limbs*.” On page 437 we find the following: “. . . he (Sayre) asserts that *all fractures of the femur may be made to unite without shortening*.”

On page 49 he says: “The statements made by Dr. Sayre, that even simple fractures of the short or long bones *can always be made to unite without shortening*,”\* etc. There may be other places in his book where he has referred to me in a similar manner, but these three quotations, almost identical in language, occurring in widely different parts of his book, evince a determination on the part of Dr. Hamilton to misrepresent me before the profession, for he cannot refer to a single line I ever wrote, or any lecture I ever delivered, that would justify any one of the

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\* The italics are mine.

sentences I have here quoted. On the contrary, in the very table of cases which I presented to the Association at Detroit to prove the correctness of my plan of treatment, *only* four were claimed to be perfect out of the whole number of cases presented. On page 49 Dr. Hamilton describes a case brought in his clinic and measured by himself, Dr. Krackowizer and others, and found to be shortened one inch, "but Dr. Sayre thought it was a little lengthened," and then says: "It will not be difficult to understand, from the results of measurement in this case, that Dr. Sayre would meet with examples of perfect restoration of the bone oftener than Dr. Krackowizer or myself." I made no measurement in this case at all, but, as Dr. Hamilton and the other gentlemen who measured the case, differed as to the amount of shortening, and as a measure must always be the same, I merely put the tape on the limb, from the anterior superior spinous process to the malleolus, in the same manner as they did, in order to show them that the *mode of measurement was unreliable*; and for Dr. Hamilton to represent this as an actual measurement on my part, to ascertain the exact length of the limb, is a misrepresentation of the facts as they occurred.

On page 57 he says: "A distinguished English surgeon has recently said that he has given up measuring broken thighs—because of the uncertainty of measurements, I infer." If the measurement is made in the usual way, and as was done by Dr. Hamilton and others in the case referred to, I think the distinguished English surgeon is correct, and I certainly agree with him. The only reliable instrument for exact measurement of the thighs is that of Dr. Thomas Holgate, of this city, and as I did not have it with me at the time, *I made no actual measurement of the case at all*, but merely went through the form of imitating Dr. Hamilton's measurement for the purpose of demonstrating to him and the others present that it was unreliable.

In referring to the tabulated cases of Dr. Van Wagenen, attached to my report, and in which I had stated before the Medical Association that Dr. Ham-

ilton had measured some of them, he says on page 438, "*I never measured or saw the cases mentioned by him.*" \*

It is, of course, an exceedingly unpleasant duty to flatly contradict any gentleman who deliberately makes so bold and positive an assertion as this is, but justice to myself demands that it must be done, and I therefore refer to the following letters to show that this statement is positively untrue.

" 101 N. SIXTH STREET, NEWARK,  
" March 7, 1881.

" DEAR DOCTOR—I regret delay in answering your first letter in reference to the measurement of fractures treated in Bellevue Hospital while I was on the staff.

" In answer to your question, I would say :

" *First.*—Prof. Hamilton did measure some of the fractures recorded in the tables which I prepared, though he was not on service as visiting to my division, the second, except on two or three occasions, when he acted as substitute for other surgeons.

" *Second.*—Remarks which I heard him make certainly made me believe that he did not think a fractured limb was ever restored to its full length. I think this idea of his opinion on the subject prevailed among the house staff during my service.

" *Third.*—I do not remember hearing him say that *three cases* would convince him, though such a rumor was prevalent.

" *Fourth.*—I remember asking him to measure a fractured femur in what was then Ward 7. This is especially recalled to my mind because a number of the house staff had measured, and no one had made any shortening. One or two had claimed an eighth-inch lengthening.

" It was suggested that Prof. Hamilton should see this case, as he did not believe in lengthening or even in perfect cure. As I heard him coming through the hall at the time, I asked him to measure the case. When he said he made it from one-eighth

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\* The italics are mine.

to one-fourth of an inch short, I said I could not make it short, when he measured again and held up the measure before the staff. Attention was called to the fact that he had made the *un*-fractured limb short.

“*Fifth.*—The members of house staff at the time were Fluhner, McBride, Burchard, W. T. Bull, and Bangs, of the City. Bull and Burchard would be most likely to recall it.

“GEO. W. VAN WAGENEN, M.D.,  
“House Surgeon, Bellevue, Second Div., 1871-73.”

“24 WEST FORTIETH ST., February 27, 1881.

“PROF. LEWIS A. SAYRE :

“My DEAR DOCTOR—In response to your enquiries of the 25th inst., I would state :

“*First.*—That Prof. Hamilton, in my presence and that of other members of the staff, did measure many of the cases of fractured femur treated by the plaster-of-Paris dressing, in the wards of Bellevue Hospital, that are incorporated in Van Wagenen’s statistics.

“*Secondly.*—In two instances, to my personal knowledge, of those thus treated, Prof. Hamilton, after repeated measurements, admitted, and with unmistakable reluctance, that ‘he could detect no shortening.’ One of these cases occurred in Van Wagenen’s service in old Ward 7, and confirmatory measurements had previously been made by Profs. Sands, Gouley, and others. In commenting on this case, subsequently, Prof. H. spoke of the result as a most exceptional one.

“The other case occurred in Fluhner’s service, I think, in Ward 16. Prof. Hamilton in this instance admitted to Drs. Fluhner, Griffith, myself, and others, that he could detect no appreciable difference in the length of the limbs. . . .”

“Very truly yours,

“T. HERRING BURCHARD, M.D.”

“NEW YORK, February 27, 1881.

“DEAR DOCTOR SAYRE : I saw Prof. F. Hamilton on several occasions measure thighs that had been fractured.



"In one or two instances he made, after repeated trials, the fractured side longer than the uninjured one. In one case under my own treatment he made the increase nearly one inch.

"Dr. St. John will, I think, be able to give you more facts bearing upon the question than I can, as the contest became warmer after my hospital service expired.

"Very truly yours,  
"J. D. BRYANT, M.D."

"HARTFORD, CONN.,  
"February 21, 1881.

"DEAR SIR—I think Dr. Hamilton's memory is at fault if he does not remember at least two cases which he measured in my presence and found no shortening, for I remember the fact distinctly, and how it was talked over among the staff. I also recall his measuring several other cases and finding the shortening so slight ( $\frac{1}{8}$  or  $\frac{1}{4}$  of an inch) as to be of no practical account . . . My impression (which is almost a conviction) is that I saw him measure four or five and admit no shortening, but I am positive about only two—one in Ward 7 and one in Ward 5."

"Cordially yours,  
"S. B. ST. JOHN."

"142 WEST THIRTEENTH ST., March 24, 1881.

"DEAR DOCTOR—Your inquiry if I ever saw Dr. Hamilton measure any case of fracture of the femur that had been treated in plaster-of-Paris, and included in Van Wagenen's report, received. I have a very distinct remembrance of seeing him measure a patient treated by Dr. Lee (house surgeon) for fracture of the femur. The measurements were made just after the plaster splint had been removed. At first Dr. Hamilton made the limb on the side of fracture longer than its fellow; then, upon re-measuring, he found the difference so trivial that he remarked to Dr. Lee that he had no evidence that the bone had ever been broken. To the other interrogatories I am unable to give a definite answer.

"Very truly yours,  
"WILLIAM F. FLUHRER."

I think I have quoted sufficient evidence to prove that Dr. Hamilton has misrepresented me in his book, and also to justify me in laying the matter in this public way before the profession.

I trust that the various medical journals that have reviewed his book, and have referred to these misstatements, will at least do me the justice to republish this refutation.

LEWIS A. SAYRE, M.D.

285 FIFTH AVENUE, March 14, 1881.