

the patient's right arm, however, an attempt was made to remove the necrotic and diseased tissue. With ether anesthesia the ulna was exposed throughout its whole extent. The soft tissues were retracted and the olecranon process and upper end of bone entirely removed subperiosteally. The remainder of the shaft was drilled out with a small dental burr, the larger ones not having been made at that time. All necrotic tissue was removed and a smooth, clean, hard bed of bone remained. This was filled with bone wax and the soft tissues sutured without drain.

The man now has good extension of his forearm, in spite of absence of the olecranon process, and a strong grip in his hand and is able to work.

32 North State Street.

THREE CASES OF WIRING WITH ELECTROLYSIS FOR AORTIC ANEURYSM

ONE HERETOFORE IN PART REPORTED *

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I wish to report three additional cases of wiring with electrolysis for aneurysm of the thoracic aorta, in one of which (Case 2) the patient illustrates the beneficial effects of this procedure more than four years after the first operation and more than two years after the second wiring, which was resorted to because he had a return of very severe pain and a marked bulging near the site of the original sac.

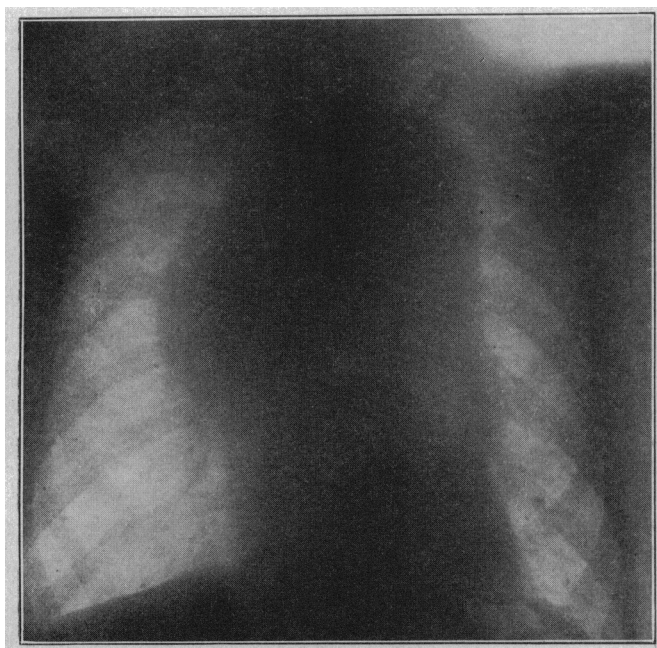


Fig. 1.—Enormous aneurysm of ascending arch (Case 1) before wiring.

CASE 1.—A man, aged 55, had a large pulsating growth in the upper zone of the right chest, anteriorly, which extended from the second rib in the midclavicular line to the fifth rib (Figs. 1 and 2). The growth did not point, in the sense that it presented a spot which was elevated above the rest of the swelling, but in the center there was a spot where expansile pulsation was marked and the tissues very soft and tender on palpation. The chief symptoms consisted in severe pain and dyspnea.

* Read before the College of Physicians of Philadelphia, March 3, 1914.

The record of the operation is as follows:

1:15 p. m., Feb. 22, 1912: 5 milliamperes.
1:19: 10 milliamperes.
1:23: 15 milliamperes.
1:27: 20 milliamperes.
1:28: Wire broke close to needle.
1:29: 5 milliamperes.
1:32: 10 milliamperes.
1:33: 15 milliamperes.
1:34: 20 milliamperes.
1:35: 25 milliamperes.

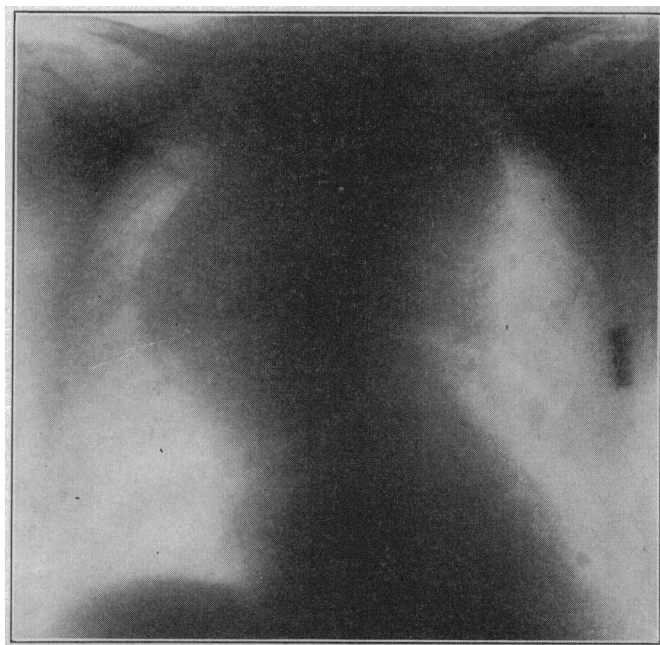


Fig. 2.—Same case of large aneurysm as that shown in Figure 1, wired Feb. 22, 1912; wire coiled in aneurysm, which is lessened in size one week after operation; the patient returned to work and was killed ten months later while walking on the railroad.

1:36: 30 milliamperes.
1:37: 35 milliamperes.
1:41: 40 milliamperes.
1:44: 45 milliamperes.
1:49: 50 milliamperes; maximum amperage, maintained for one minute.
2:00: 45 milliamperes.
2:00:30: 40 milliamperes.
2:01: 35 milliamperes.
2:01:30: 30 milliamperes.
2:02: 25 milliamperes.
2:02:30: 20 milliamperes.
2:03: 15 milliamperes.
2:03:30: 10 milliamperes.
2:04: 5 milliamperes.
2:05: Discontinued.

Insertion of needle at 1:01 p. m.

Insertion of wire begun at 1:03 p. m.

Current started at 1:15 p. m. and discontinued at 2:05 p. m.

Length of operation, one hour and four minutes.

The patient, notwithstanding the fact that his circulatory state was somewhat excited by the performance and interruption of the operation, whereby the pressure in the sac was increased, stated when the current had passed for twenty minutes that his chest felt more comfortable and that he had less pain. Twenty-four hours later he had great hoarseness so that he could speak only in a whisper and he developed signs of pulmonary congestion at the base of the right lung, which cleared up in forty-eight hours under the use of full doses of atropin. The hoarseness gradually decreased, and when he returned home four weeks later had almost disappeared. More than three months later the patient wrote that he was "getting along very well" and "feeling pretty well."

Again, July 10, 1912, he wrote: "I am able to talk pretty well, but get husky when doing very much talking."

In October, 1912, eight months after wiring, this patient came from his home in Johnstown to Altoona, hearing that I would be in the latter town, and stated, after walking about a mile up a steep grade from the station, that he had come to show how well he was. He then walked back to the station without distress. Eleven months after the operation, while walking along the railroad track, he was struck and killed by a train backing down on him.

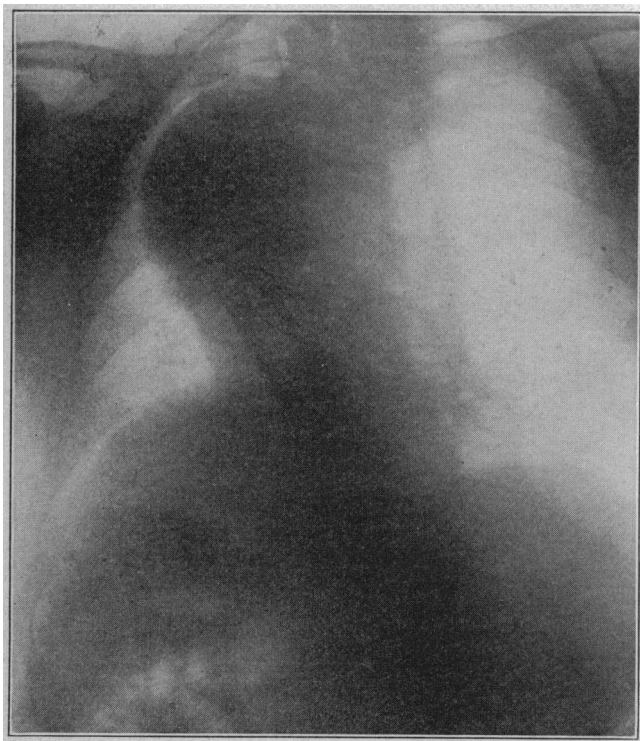


Fig. 3.—Upper wire put in by Dr. Beardsley in November, 1909, and lower wire introduced by the author in February, 1912, extending down the aorta because it did not coil as gold wire does; patient (Case 2) alive and well.

It will be seen that thirteen minutes after the current was turned on there is a note that the wire broke off. On examining the end of the hollow needle I found that there was a green fluid like verdigris. Fortunately, I was able to push the end of the wire, past that already in the needle, into the sac and continue the procedure, starting the current again at 5 milliamperes.

As this was the second operation in which this untoward accident occurred, I investigated the matter and found that the alloy mixed with the gold was copper and that the copper had been eaten out by the current, proving that a wire made with gold and copper is an unsafe wire because it might be impossible or inadvisable to get more wire in and, if the break occurred after the clot formed in the needle, the further use of electricity would be impossible, although it is absolutely essential to success. At my request, one of the experts of the Philadelphia Electric Company was kind enough to undertake a series of experiments to determine the changes in different kinds of gold wire and silver wire produced by electrolysis, using the same strength of current that I employed clinically, and employing normal salt solution to represent the tonicity of the blood. His results were as follows:

Electrolyte.—This consisted of saline solution having 1 teaspoonful of salt to 1 pint of water.

Electrodes.—The positive electrode was the sample wire to be tested. The negative consisted of copper wire.

Current Used.—A current of 50 milliamperes was allowed to pass for one hour.

RESULTS OF TEST

Sample	Weight Before	Weight After	Change in Weight
	mg.	mg.	
Yellow gold	100	97	3 per cent. decrease
Red gold	259.1	160	38 per cent. decrease
Silver	283	298.1	5 per cent. decrease

The yellow gold wire was practically the same after the test as before, its physical appearance being the same.

The red gold wire became very brittle after the test and changed to a blackish color.

The silver wire took a grayish-blue deposit, and was as flexible as it was before the test.

The saline solution in each case became somewhat of a greenish color.

Chemical analysis of the solution and of the deposits on the wire was not made.

The fact that copper was used for the negative electrode may be partly the cause for the greenish color of the solution. It was unfortunate that platinum wire was not used for the negative electrode. Although this test was rough and approximate, the results give very interesting information as to the kind of wire to be used.

CASE 2.—The patient is an intelligent colored man, aged 61, who appears hale and hearty. He was first wired when in the service of Dr. Rhoads by my chief of clinic, Dr. Beardsley, Nov. 1, 1909, four years and four months ago, for a large growth of the descending arch, pointing anteriorly, and wired a second time by me Feb. 23, 1912, more than two years ago, since which time he has been to his home in New York State near Albany. After his first operation he worked hard and on one occasion visited friends by walking 60 miles. A report of this case, after the first operation, was published by Dr.



Fig. 4.—Large aneurysm of ascending arch (Case 3) wired July 13, 1912; wire coiled in sac and extending all the way from right to left; roentgenogram taken one week later.

Beardsley.¹ Aside from the patient's being practically well so far as pain and dyspnea are concerned, the case is interesting in that it is the only one in which I have employed silver wire, using silver wire because I had used all the gold wire I could obtain on the previous day in the case just

1. Beardsley, E. J. G.: Symptomatic Relief in Aortic Aneurysm by Wiring and Galvanism (Moore-Conradi Method), *Therap. Gaz.*, March 15, 1911, p. 156.

reported. This man's symptoms were so urgent as to pain, dyspnea and the appearance of the aneurysm, which looked as if it was about to burst, that I felt justified in using silver wire, but I never shall do so again because his survival is most remarkable. The silver wire, having no spring, did not coil, and therefore extended itself far beyond the sac, and the roentgenogram (Fig. 3) shows that it not only entered the aneurysm, but passed not once but several times up and down the aorta as low as the diaphragm. The plate shows this better than the photograph. Why the process of coagulation which closed the sac did not also close the aorta I do not know, but some of the wire certainly went far afield from where I intended it to go. Figure 3 shows the wire placed in the sac in 1909 by Dr. Beardsley above the silver wire which I introduced Feb. 23, 1912. Since that time the patient has been up and about and in excellent condition, with little or no pain except on active exercise.

CASE 3.—This patient presented a large aneurysm of the ascending arch as shown in Figure 4. The roentgenoscopic report made by Dr. Manges was as follows:

"Mr. ——— has a large sacculated aneurysm involving all of the transverse arch and the latter part of the ascending arch. The apex of the sac lies in close relation with the anterior chest wall on a level with the second interspace and about the midclavicular line. There is a considerable space between the posterior surface of the sac and the posterior chest wall, on the right side. On the left side, however, the sac approaches more nearly the posterior wall than the anterior, although it is not in close relation with either. There is no evidence of erosion of the ribs as far as I am able to determine, but the aneurysmal sac completely obscures a portion of the chest wall."

The patient suffered from agonizing pain and urgent dyspnea with incessant cough, and could lie without strangling only on the left side. The record of the operation is as follows:

12:51 p. m., July 13, 1912: Needle inserted.

1:07: Current turned on.

1:07:1:12: 8 milliamperes.

1:12:1:17: 20 milliamperes.

1:17:1:22: 30 milliamperes.

1:22:1:37: 40 milliamperes.

1:27:1:32: 50 milliamperes.

1:32:1:47: 60 milliamperes.

1:47:1:48: 50 milliamperes.

1:48:1:49: 40 milliamperes.

1:49:1:50: 30 milliamperes.

1:50:1:51: 20 milliamperes.

1:51:1:52: 10 milliamperes.

Current turned off at 1:52 p. m.

The patient was in a desperate state, but within two days after operation he could lie on his back and right side with comfort. He had been unable to lie on the right side without great dyspnea and cyanosis for weeks. Cough had been most excessive.

Two months after operation he wrote from his home in Pittsburgh, Pa., that he had been out of the house only once and often had great pain in his heart and chest and all over the body and limbs. Ten months after the operation he wrote as follows:

"I am not getting very strong since the operation and have been able to do but very little work; don't seem to get any strength in my limbs; can lie in only one position and that is on my left side. Neither can I recline in a chair, as the pressure on my back starts me to coughing. It also hurts to raise my right arm and makes me cough when I attempt it. My muscles or nerves all over my body seem to be sore. The pains in my aneurysm have not occurred very frequently, but I have had several severe pains around my heart. My appetite is very good and I am almost back to my normal weight. I get very short of breath from the least little exertion or from talking; do not rest very well at nights and do a great deal of coughing in the mornings."

This patient died Dec. 24, 1913, seventeen months after the operation.

In an article previously published by me,² in which I reported a number of cases of this character, I reached the following conclusions:

1. The fact that no accident has occurred in any of the twenty-two (now twenty-five) operations I have performed leads me to believe that this seemingly radical operation is not a dangerous one, the more so as I have no knowledge of any accident having taken place when the operation was *properly* performed by others. In one reported case an attempt to wire a fusion aneurysm of the carotid artery resulted almost immediately in hemiplegia, and in another unreported case the mistake of using the negative pole in the growth loosened the clot already present and caused multiple emboli.

2. The operation is the only one that offers material hope of prolonging life, this having been prolonged in one case at least five years.

3. It is justified by the prompt relief of pain which nearly always ensues and lasts, unless the growth, extending in another direction, creates a new source of pain.

4. The diagnosis of saccular aneurysm should always be confirmed by Roentgen-ray examination, as this operation is contra-indicated in fusiform aneurysm for obvious reasons.

5. Great care is absolutely necessary that properly prepared wire be employed.

To these conclusions I would now add that, after having performed this operation twenty-five times, I can see no reason for changing the views then expressed, but I desire to emphasize once more the fact that only specially prepared wire can be used and that silver wire, because it does not coil, is an unsuitable agent.

It has been stated that this operation is useless, because the nature of the lesion is such that cure cannot be effected. If by cure is meant the total disappearance of all signs of the disease there is, of course, no cure; but if by "cure" we mean relief from agonizing pain, diminution in the size of the growth, clearing up of distressing pressure symptoms and prolongation of life when death seems very imminent, then the operation is justified, the more so as it seems to be of little danger. Patient 2 had a very marked bulging mass which is described as being as large as an orange. Inspection now fails to show any such mass. I have yet to see a patient who did not receive at least temporary and marked benefit from wiring and electrolysis.

This operation, like all other operations, largely depends for its success on how it is done. If too much current is used, serious damage and necrosis of tissues may be induced, and I am led to believe that in several cases which have not been reported by others such an error in technic has led to bad results. Thus in several of these patients I am told the current was so strong that the wire "burnt off." Such a current cooks the aneurysm. If the street current is used it is necessary not only that the table on which the patient lies should be insulated, but also that the operator wear thick, rubber-soled shoes and stand on a perfectly dry floor.

1801 Spruce Street.

2. Hare, H. A.: The Treatment of Sacculated Aneurysm by Wiring and Electrolysis, *THE JOURNAL A. M. A.*, April 13, 1912, p. 1088.

Social Causes of Disease.—The cause of most epidemic diseases are not individual but social; we must therefore protect one another; there is not a survival of the fittest but a survival of the best protected.