

Original Articles.

TORTICOLLIS.

THE RESULTS OF THE TREATMENT OF CASES OF ACQUIRED AND CONGENITAL MUSCULAR TORTICOLLIS AT THE BOSTON CHILDREN'S HOSPITAL, SINCE 1879.*

BY E. H. BRADFORD, M.D.,
Consulting Surgeon, Boston City Hospital; Senior Surgeon, Boston Children's Hospital; Professor of Orthopedics, Harvard Medical School,

AND
JAMES WARREN SEVER, M.D.,
Junior Visiting Surgeon, Boston Children's Hospital.

The object of this paper is not to consider the subject of torticollis as a whole, but to present the conclusions in regard to the treatment of torticollis as justified by the experience obtained at the Children's Hospital in the last twenty-eight years. In this paper the term "torticollis" will be applied as referring to that deviation of the head which results from the contraction chiefly of the sternocleidomastoid. The term "torticollis" is, of course, equally applicable to other forms of

others being caused by the usual rheumatic, traumatic and post-febrile conditions, such as



FIG. 1. Torticollis. Right. McDermott, age four and three-quarter years. Date of admission, May 26, 1888. Date of discharge July 13, 1888. Duration, fall at one year, torticollis began one year later. Contraction of right sternomastoid and anterior edge of trapezius. Operation, June 2, open incision, division of sternomastoid and fascia. Buckminster-Brown apparatus.

deviation of the head, namely, that resulting from the reflex spasm in caries of the spine, that resulting from muscular irritation, from the presence of inflamed glands, that from irritation following arthritis of the vertebral articulations, and that resulting from a lack of balance of the muscles following general nervous disorder, but the subject here presented will be limited to a consideration of the methods of treatment of the ordinary torticollis due to the contraction of certain muscles of which the most important is the sternocleidomastoid.

These cases of wry neck have been due to many causes, the principal one being congenital, the

*Presented before the American Orthopedic Association, at Washington, May 9, 1907.

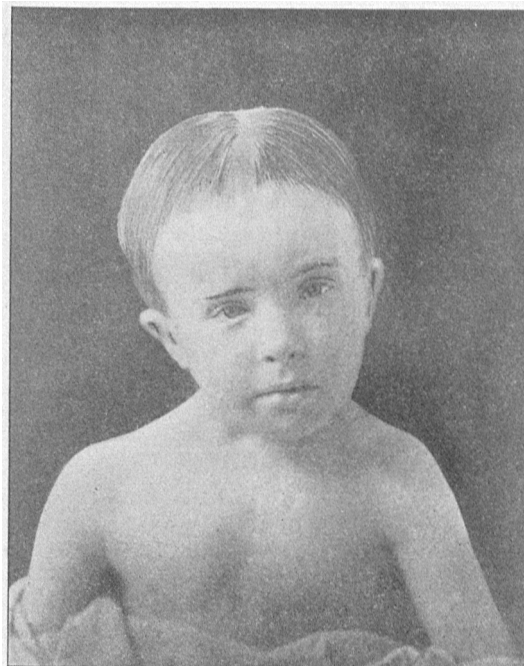


FIG. 2. Torticollis. Right. Howard, age four. Date of admission, Feb. 11, 1895. Date of discharge, April 15, 1895. Duration, two years. Cause, unknown. Operation, Feb. 14, 1895. Dead.

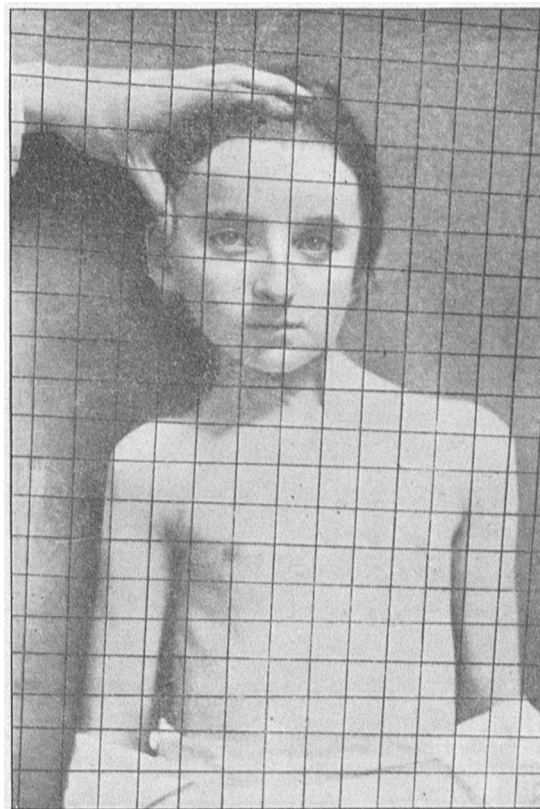


FIG. 3. Torticollis. Left. O'Connor, age eleven. Date of admission, Sept. 3, 1896. Date of discharge, Sept. 29, 1896. Duration since two years of age. No cause. Operation, Sept. 5. Fascia and probably both congenital insertions of muscles divided. Traction. Plaster.

typhoid, measles, influenza and scarlet fever. There have been a number of cases of torticollis, but not of the true muscular type, due to tuber-

culosis, of the cervical vertebrae. These, however, have not been considered in this paper.

We intend to show by this report that muscular torticollis in children from two to twelve years of

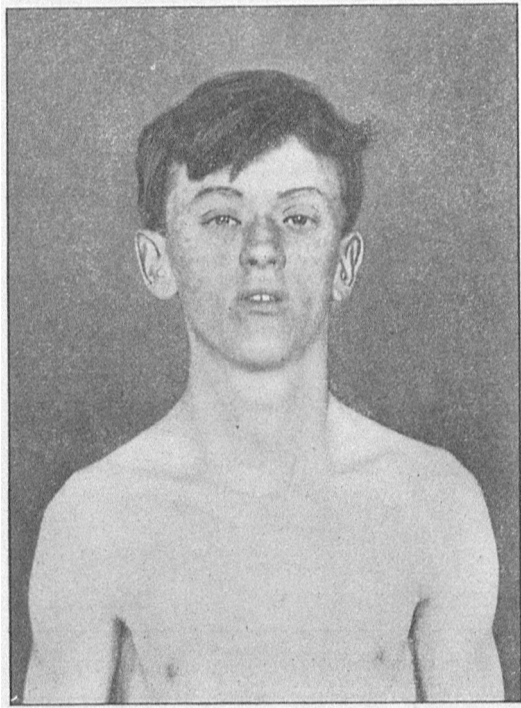


FIG. 4. Torticollis. Right. Driscoll, age five. Date of admission Aug. 28, 1896. Date of discharge, Sept. 3, 1896. Duration, three years. Since birth. Operation, Aug. 28, incision, myotomy, plaster.

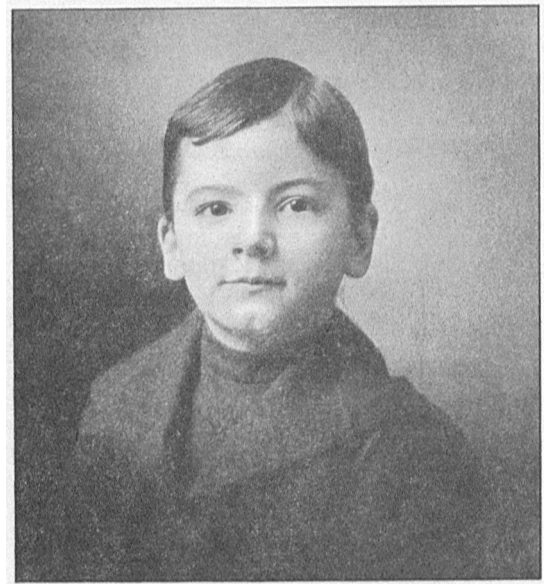


FIG. 6. After operation.

age is easily cured by appropriate methods; that the result is immediate, that no post-operative gymnastics are needed so far as the cure of the deformity itself is concerned, that simple resection of the two origins of the muscle is all that



FIG. 5. Before operation.



FIG. 7. Torticollis. Right. Carew, age eleven and one half. Date of admission, Feb. 15, 1900. Date of discharge, Feb. 28, 1900. Duration, since birth. Operation, Feb. 20, incision, myotomy. Buckminster-Brown brace.

need be done, and that only rarely need the Scalenii be divided; that the simple transverse incision is the best, and causes the least deformity in the resulting scar; that it is not necessary to remove the entire muscle, as has been done, and that the after-treatment is simple, and of not long duration.

We are able to report, however, one case, a child a day old, which presented torticollis due to a partial rupture of the sternocleidomastoid of one side, the result of manipulation at birth.

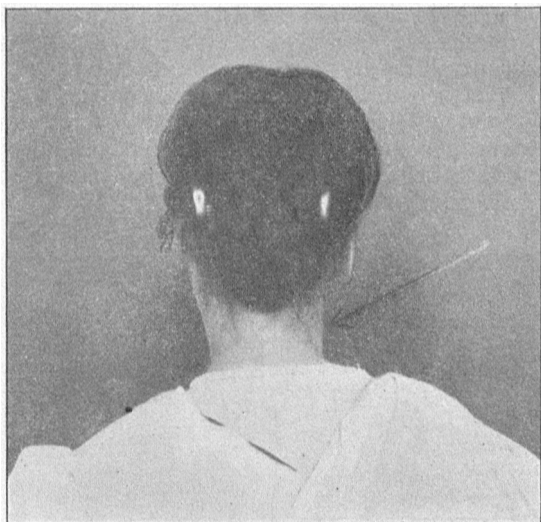


FIG. 8.

Whether this is a common cause of torticollis is a subject which will require the presentation of other facts than those the writers have at their command.



FIG. 9. Torticollis. Left. Carmel, age ten. Date of admission, Sept. 5, 1900. Date of discharge, Sept. 17, 1900. Duration, three years following measles. Operation, Sept. 11. Incision, myotomy, plaster. 31

ETIOLOGY.

In considering the etiology of the cases of torticollis occurring at the Children's Hospital since 1879 a number of them may be easily accounted for by various traumatic or inflammatory causes.

These, however, form but a small part of the total number of cases.

In looking over Table No. I, it may be seen that those cases which have had a congenital origin form by far the largest number individually.

TABLE NO. I.

Total number since 1879,	90
Total number operated upon,	72
Congenital,	46
Not ascertained,	21
Abscess of neck,	3
Rheumatic,	5
Post-typhoid,	1
Post-measles,	1
Post-scarlet fever,	2
Cervical adenitis,	2
Hematoma at birth,	2
Instrumental labor,	4
Influenza,	1
Traumatic,	2



FIG. 10. Torticollis. Left. Clark, seven years, eleven months. Date of admission, Aug. 15, 1902. Date of discharge, Aug. 21, 1902. Duration, last two years. Operation, Aug. 18. Incision, myotomy with plaster cuirass.

It will not be necessary to consider further these cases from an etiological point of view, with the exception of those of the congenital type.

Congenital cases. — The usual history in these cases has been that either of a deformity existing at birth, or of a gradually increasing deformity since birth. In none of these cases was there any history of hematoma or instrumental delivery.

There have been so many opinions expressed and causes assigned by various writers as to the cause of congenital torticollis, that it seems wise to review them briefly.

In looking over the great mass of literature on this subject we find that no definite conclusions have yet been reached. The theory of a hematoma alone as a cause has been disproved by Whitman and others, and Witzel has shown by experiments on animals that the artificial production of a hematoma is not followed by contraction of the muscle, either transitory or permanent.

Heredity is to be considered, but is not infallible.

Three of our cases occurred in the same family in successive children.

Diffenbach, Jeannel, Pfeiffer, Fischer and Jachimstal in defense of their theories all cite cases of hereditary torticollis.

The co-existence of other congenital malformations is to be considered as a cause also, such as clubfeet, hands, congenital dislocation of the hip, etc. In none of our series of cases was there any accompanying deformity.

Nervous origin. — Nélaton, Golding Bird, Galavardin and Savy think that the cause may be sought in a lesion of the central nervous system, and cite a case with autopsy where there was found atrophy of the anterior horns of the spinal cord in the upper cervical region. They think that it may be analogous to infantile paralysis.



FIG. 11. Showing after-treatment with Buckminster-Brown brace.

However, the most plausible and reasonable theory which has yet been advanced is that of Josserrand and Vianny, who advocate the *ischémique théorie*.

By a series of autopsies on cases of congenital torticollis in babies, with careful dissection of the sternocleidomastoid muscle with its blood supply followed by injection experiments on the arteries they have shown that the sternal head receives normally the smallest amount of blood furnished to any other portion of the muscle. With the head flexed and rotated in the position it would normally resume "in utero" the arterial supply is much diminished, or wholly cut off, owing to pressure on the sternomastoid middle artery, by the surrounding parts, and the proximity of the

thyroid cartilage. This artery is a small branch from the superior thyroid artery, and is the sole source of supply to the sternal head of the sternomastoid muscle.

The deformity then is due to a markedly diminished blood supply, resulting in a degeneration of the muscle fibers, with subsequent sclerosis and contraction.

Facial asymmetry. — The question of facial asymmetry has not been covered as yet, and there are several points of interest to be considered in connection with it. Taken in order these are as follows:



FIG. 12. Three sisters. Posterior view.

1. Causes of facial asymmetry.
2. Is it present at birth in congenital cases of torticollis?
3. How long may a case go without operation before the facial asymmetry becomes permanent, even after operation?
4. Is it wise to operate upon a case of long standing torticollis, with marked facial asymmetry which may result in a cure of the wry neck, but cannot cure a facial deformity?

1. "Asymmetry of the face is ascribed to the gravitation of the blood to the more dependent side, to muscular tension, to pressure and retarded development of the vessels and nerves on the side of the concavity; to tension of the soft parts, particularly the muscles of the sound side and the interference with function." (Young.) The atrophy of the affected side is probably due to faulty nutrition on account of compression of the carotid artery and other great vessels on the affected side, and to the misplacement of the epiphyses of the basilar portion of the occipital bone and the effect of the weight of the skull on the other cranial and facial bones. This latter theory probably explains the osseous changes in the face and asymmetry of the skull.

2. In most cases of congenital torticollis there is a facial asymmetry existing at birth.

3. A number of our cases were of eight and even ten years' duration, before operation, but examinations at present show practically no asymmetry or atrophy. It is probably safe to say that all

cases should be operated upon between two and ten years of age, if permanent deformity is to be prevented.

4. In adults with torticollis of long duration, presenting marked atrophy and asymmetry, it becomes a question for the patient to decide after having the situation fully explained to him. The asymmetry will probably not clear up, and the atrophy may become more noticeable.

PATHOLOGY.

There were no opportunities in our series of cases to verify the pathological condition in the cases of congenital origin, but as these conditions have been pretty well worked out by others we will simply summarize them briefly.

It is usually the sternal head which is affected. This presents on examination an interstitial degenerative myositis. It has never presented the characteristics of hemorrhage with muscular rupture.

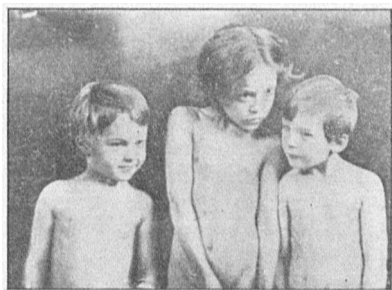


FIG. 13. Three sisters. Anterior view.

The affected area is usually found entirely deprived of muscular fibers, with few exceptions presenting a waxy, hyaline condition. What few muscular fibers may be left show a disappearance of their striae. This condition is constant in children from two to ten. It is also found in any part where the vascular supply is interfered with, as in the ischemic paralysis of Volkman, too long use of the Esmarch bandage, too tight bandaging following immobilizing fractures of the arm, lesions of the great vessels, exposure to excessive cold, causing a slowing down or stopping of the arterial circulation. Histologically, these conditions are similar to those which exist in torticollis.

THE METHODS OF TREATMENT.

These may be enumerated as a non-operative method, muscular stretching, and stimulation; and an operative method, by subcutaneous tenotomy, or open incision.

The non-operative method. — In the cases which have come under this inquiry, a few have previously been treated by non-operative methods; one for several months at a western institution where the treatment consisted of a partial suspension massage and manipulation; in the second case the method was partially applied for some time by domestic nursing. Nothing can be said in favor of this method of treatment as it is mani-

festly irrational and unscientific. In all typical cases of contraction of the sternocleidomastoid muscle, the rational treatment, therefore, may be considered to be the operative method.

Operative method. — In the early experience of one of the writers, both as hospital interne and later in the early years of his practice as an orthopedic surgeon, the accepted method was by subcutaneous tenotomy. It was considered advisable to divide freely with a small tenotome both insertions of the sternocleidomastoid. One of the writers has performed this operation in two cases and would record his opinion that while the method is capable of giving satisfactory results and diminishes the danger of sepsis and does away with the possibility of a scar, yet the disadvantages of the method are so evident that no conscientious surgeon can recommend that method of operation. This will be readily seen by any one who has performed this operation by open incision and who is familiar with the anatomy of the sternocleidomastoid muscle.

The operation to be thorough will consist of an open incision thoroughly dividing the sternocleidomastoid. There has been some discussion among various writers on the subject as to the proper place of incision of the sternocleidomastoid; whether this should be divided at its insertion, the mastoid process; at its origin on the sternum and clavicle, or in its middle. There are disadvantages in the incision in each of these three points. These can be formulated as follows:

(a) The muscle at its insertion at the mastoid process can be readily reached; it can be stripped and separated well from its bony attachment

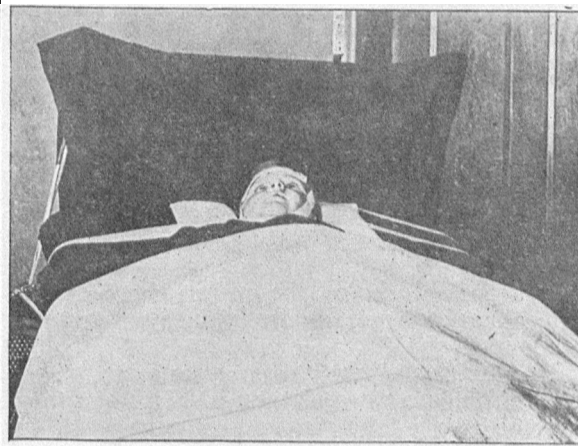


FIG. 14. Fixation apparatus in bed. After operation.

without danger of dividing or wounding the internal jugular.

(b) The operation is readily performed and the resulting scar is in a position where it will not be noticeable.

(c) The disadvantages of the division of the muscles at the mastoid process are such, it would seem to the writers, as to prevent its adoption in preference to that of the division of the muscle at its origin on the clavicle and sternum.

(d) The chief disadvantage of the division of the muscle at the mastoid process is that the muscle at its insertion has a broad attachment and may be looked upon as a surgical aphorism that it is preferable in operating to use incisions which will divide the least amount of tissue. One of the writers has performed the division at the mastoid process in three cases; the results have been excellent, and the method is one which is of value in the hands of competent surgeons, but it does not seem to the writers to have any advantages which justify its adoption.

The division of the sternocleidomastoid at its middle has been advocated by a few surgeons, with the understanding that by this means there is a greater immunity from the possibility of a relapse. The separation of the divided muscle will be greater in its middle than at its ends. The skin incision can be made in the direction of the force of the muscle and in the fold of the neck, and no great danger of a disfiguring scar need be entertained. The muscle at this point, however, is thick, the carotid artery and vein lying close to

a scar followed lasting through childhood. As a rule, however, the operation can be done with a minimum danger of any disfiguring scar. The surgeon, however, should bear this in mind and take unusual pains to prevent the scar and to secure the healing by first intention. It is desirable to plan in such a way that the scar will come just above or just below the clavicle, and that it will be parallel to the clavicle, it being manifestly easier that the skin incision should be made directly on the clavicle. In order to insure the proper position of the scar it is advisable to pull the skin up slightly before incising it. The skin can be divided without any risk if this is done, and it can be arranged that the scar should fall at a point where it will be least noticeable. The skin incision should be free, reaching from the middle of the sternum to at least one-third the length of the clavicle. The incision should be through the skin, subcutaneous tissue, as well as the external fascia, which includes fibers of the platysma. A director should then be inserted, passing it underneath the fibrinous attachment of the sternal end of the sternomastoid muscle and the muscle freely divided, cutting down on to the director which protects the deeper vessels. The director should then be inserted, passing it well under the clavicular attachment of the muscle, and the muscle divided in the same way.

An inexperienced surgeon performing this operation for the first time is apt to be disturbed at

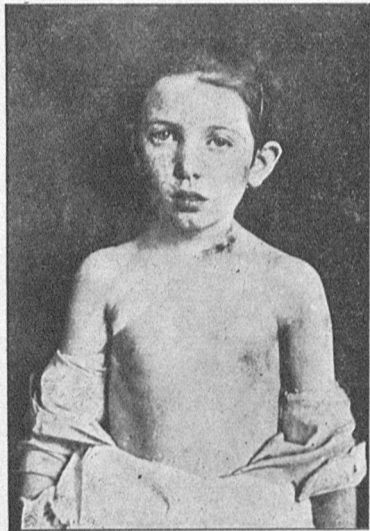


FIG. 15. Case in which scalenus anticus was divided.

it, and for this reason the operation requires an unnecessary amount of care through an increased amount of risk.

The division of the muscle at its origin on the clavicle and sternum has the advantage of attacking the muscle where it is most superficial, the most easily reached, with the least dissection. It is for this reason that the writers would unquestionably place their preference for this point as the point for the muscular division in the treatment of torticollis.

It is advisable to take certain precautions to gain the best possible results. The question of scar is one which is of importance. A disfiguring scar upon the neck is, of course, a matter of some moment, and in one case operated upon by one of the writers a small keloid developed, which became a noticeable blemish. In a few other instances the union was not by first intention and

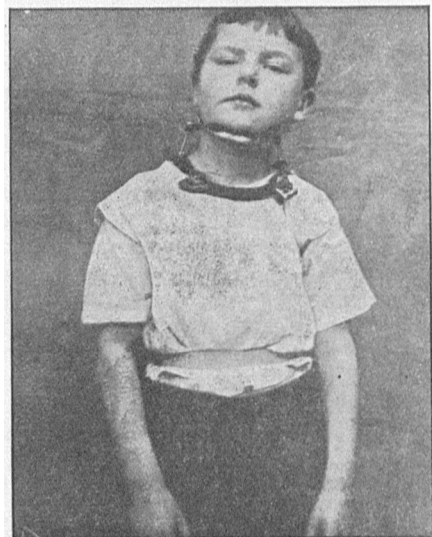


FIG. 16. Buckminster-Brown brace. After operation.

the size of the gap which follows, the retraction of the muscle, and also the apparent depth of the resulting hole. This need, however, occasion no alarm. It is essential that the whole of the muscle should be divided and that the muscular division should be made half an inch above the insertion. After the incision is made in the skin and the retracting pressure removed, the incision will be found to have its center just below the clavicle. This may be regarded as the point of selection, although it may be regarded as neces-

sary to divide the whole of the muscle, including the fascia which covers it, and any fibrinous bands which are lying in the course of the muscle. In order to be sure that everything is divided it is advisable for the surgeon to pass his gloved finger into the wound in order to feel if anything remains undivided. The surgeon should not, however, attempt to divide the deep cervical fascia which is entirely free from the sternocleidomastoid and which, lying directly over the internal jugular, should be spared. One of the writers wishes to record an error made in violating this caution, where a division of the deep fascia was performed in an excess of zeal from the desire to prevent the persistence of any possible contraction. The incision wounded the internal

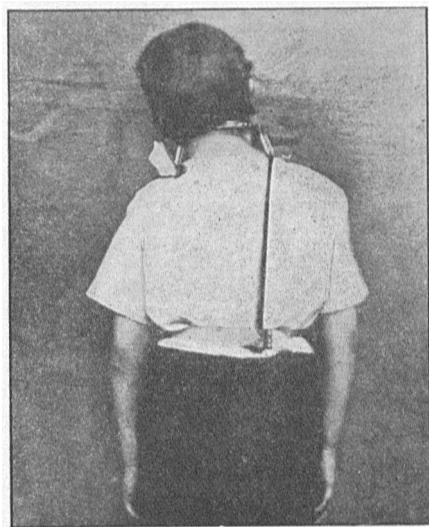


FIG. 17. Posterior view.

jugular and it was necessary to tie that vein, an operation which was both vexatious and dangerous. Fortunately no untoward result followed.

After the muscle is completely divided at both insertions, the surgeon or his assistant should take the patient's head in both hands and, having the shoulders held firm, the head should be twisted into an over-corrected position, and in this way all contractions in other minor muscles stretched.

One of the writers in one case was led to divide the scalenus anticus, but in the usual cases, in children at least, such an operation is entirely unnecessary.

If the operation is properly done no vessels are to be tied and the wound should be carefully closed. It is desirable not to pack the wound nor to leave drains in, in order to insure the absence of a scar. It is needless to say that complete asepsis is essential and that it can be readily secured by the employment of ordinary precautions. Although a cavity is left by the operation which would seem to require drainage, in the cases observed by the writers this has occasioned no trouble as the healing has taken place with the absorption of the blood clot.

Various ways are employed in dressing the wound from the ordinary dry dressing to sealing the wound with a tincture of benzoin. The writers are of the opinion that it is advisable to protect the wound with great care, not only from any septic invasion, but also from any friction. There is no great danger of wound gaping; and it is perfectly safe to close it with catgut sutures, but tension sutures should also be applied. The wound should be covered either with silver foil, or gelatin foil in order to prevent the possibility of rubbing the dry dressing; if that is not done the wound should be dressed the day following the operation.

After-treatment. — At the Children's Hospital two methods of fixation of the head following operation have been practised, both having been successful, and the writers have at various times preferred one and later the other manner of fixation.

If the child after an operation is placed upon a frame and the corrected position of the head maintained by three straps of adhesive plaster (see plate), one along the cheek of the elevated side, passing under the chin and stretching to a cord which hangs over the side of the bed, the chin can be held in an over-corrected position, provided a counter force is exerted by a strap of adhesive plaster passing upward over the opposite cheek, and a third strap passing under the patient's head, also connected with a weight, holds the plane of the face in a corrected position. These three straps can be arranged in a way to cause no

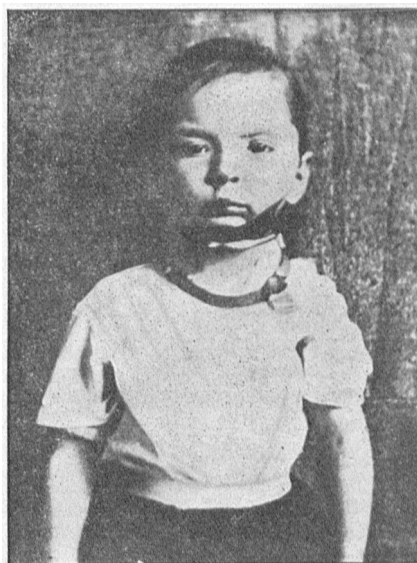


FIG. 18. Showing post-operative corrective apparatus.

discomfort. They permit the dressing of the wound if that is necessary, and, secured by sand bags at both sides of the head, furnish adequate fixation of the head in a corrected position.

In the earlier operations this was the method employed in all cases, but later the advantages of plaster of Paris as a means of fixation seemed manifest, namely, that the irksomeness of con-

finement to the bed is avoided for the patient. Considerable care must be exercised, however, in the application of the plaster of Paris bandages. In the first place the bandage must be applied in such a way that the head is securely held in an over-corrected position, the chin pointing to the opposite side to that which it held before, the plane of the face turned in an opposite direction from that which was held previously, and the ear on the contracted side, which was previously

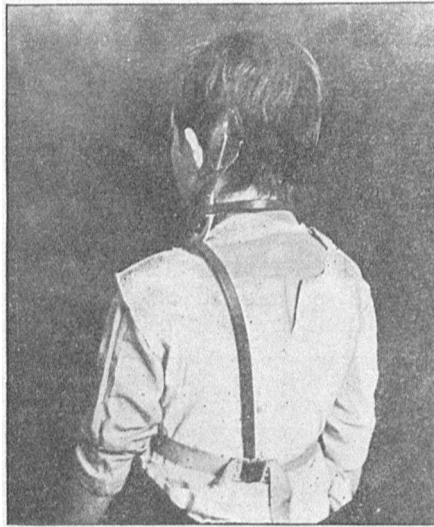


FIG. 19. Showing post-operative corrective apparatus.

advanced, should be secured in a position more posteriorly. The mastoid process on the affected side should be as far away from the clavicle as possible. It is also important that the plaster of Paris bandage should not rub upon the wound. A window can be cut in the plaster so that the wound can be dressed or inspected.

In the application of the plaster bandage it is desirable that the upper part of the thorax be kept down, which, before the operation, had been raised. If the bandage is properly applied it causes no discomfort, but it can be readily seen that an improperly applied bandage would demand speedy removal.

Where the surgeon is perfectly sure of his technique, and a comfortable bandage is applied, it should be worn without change for a month, after which it can be renewed or left unchanged; but in case of the removal of the bandage some form of retention apparatus should be worn for at least three months following the operation.

Of the various apparatus which have been recommended the writers have found the wire collar, a modification of that introduced by Buckminster-Brown, the simplest and most efficient. In place of this, however, a leather collar, including the neck and also the upper part of the thorax, can be used. It is advisable that over-correction should be maintained for at least three months, after which the head may be gradually freed from its support and massage

employed if desirable. As a rule, however, massage is not necessary.

These technical details, although tedious, are perhaps of some importance as they lead to the establishment of satisfactory results which have been obtained at the clinic at the Children's Hospital. It has been somewhat of a surprise to read in many of the journals of the dangers of relapse following the operation for torticollis. In order to determine this, the writers have examined the records of the Children's Hospital, going back twenty-eight years. The cases that were investigated were not all operated on by the writers, but by the writers and their colleagues. No classification is made of the names of the operators, but the method of operation and the technique employed have been substantially the same by the various surgeons performing the operation.

The number of cases investigated was 90; replies were received from 62 cases. The records of such cases as were not heard from were obtained in the hospital, and a note made of their condition at their last visit. As these cases were chiefly the ordinary hospital cases, the after treatment being carried out in the out-patient department, which includes no better care than what is furnished in most out-patient departments, and when it is recorded that recurrence took place in only two cases, and that in one no benefit was considered to be derived from the operation, by the parents, it may be considered that the operation is one which promises

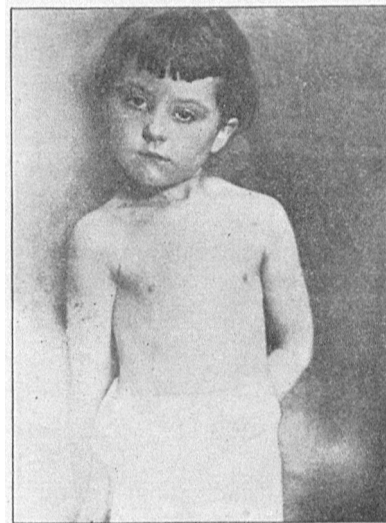


FIG. 20. Showing contraction of sternomastoid muscle.

with ordinary care and after-treatment perfect results.

It is essential that the operation should be carefully done. It is also essential that the after-treatment should be thoroughly carried out. Neglect of either of these two factors would be followed by failure or partial success, but with attention and thoroughness the certainty of cure may be guaranteed.

RESULTS OF TREATMENT.

TABLE NO. 1.

Causes.	Operation.
Congenital,	43
Not ascertained,	15
Rheumatic,	1 sub-cutaneous tenotomy
Traumatic,	3
Cervical abscess opened and drained,	3
Instrumental labor,	4
Hematoma,	1
Post-influenza,	1
Post-measles,	1

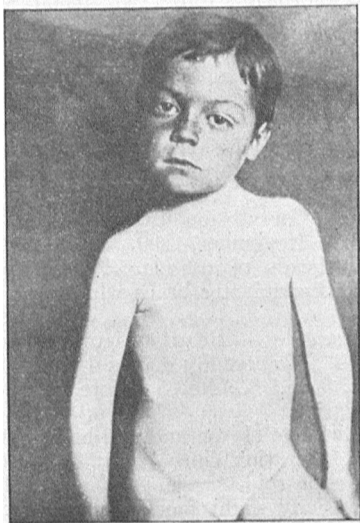
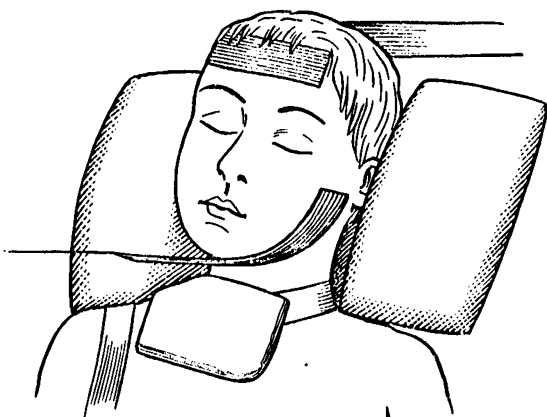


FIG. 21. Showing contraction of sternomastoid muscle.

There were two cases in which there was a second operation owing to a recurrence of the deformity at intervals of four years in each case. This recurrence was due probably to two causes, namely, lack of completeness of the operation, and insufficient attention to after-treatment.



Showing adhesive strap for over-correction in bed. Post-operative.

The recurrence, however, in but two of the cases traced, answers well for the routine carried out at the hospital, and the skill of the operators. One of these cases was of the congenital type, and one was due to instrumental delivery. Since the second operation there has been no further

difficulty, and the results on one of these cases may be seen by referring to picture No. 1.

Post cards were sent to each one of the cases in the series, asking for the present condition of the case, how long a brace or any other apparatus was worn following the operation, and requesting the patient to report to the hospital if the distance from Boston was not prohibitive.

Replies were received from 62 cases, 12 were not heard from, and 18 reported for examination and photographs. The replies received were intelligent and answered the questions asked, and the tabulated results may be seen in Table No. 2.

TABLE NO. 2.

RESULTS OF CASES OPERATED ON SINCE 1879 AT THE CHILDREN'S HOSPITAL.

Number of years after operation.	in Head straight all planes.	Improved.	No benefit.	Recurrence.	Not heard from.
1	11	4			1
2	3				
3	5				
4	7	1			
5	2	1		1	
6	3				1
7	3	1			
8					
9	1				
10	2				2
11	1				1
12	2			1	
13	1				
14	2				
	2				
16	2				
17	4				
18	2				
19			1		1
20					1
22		1			
23					
24					1
25					2
26					2
Totals,	53	8	1	2	12
Counted twice, 2.					

TABLE NO. 3.

Total number since 1879,	90
Total number operated,	72
Total number stretched,	2
Number discharged with apparatus,	28
Number discharged without apparatus,	7
Number discharged with Thomas collar,	10
Number discharged with plaster,	27
Right-sided,	37
Left-sided,	36
Not noted,	2
Died in hospital from intercurrent causes,	4
Died outside the hospital from unknown causes,	1
Average age,	6.8
Boys,	39
Girls,	51
Oldest operated,	12 years
Youngest operated,	2 years

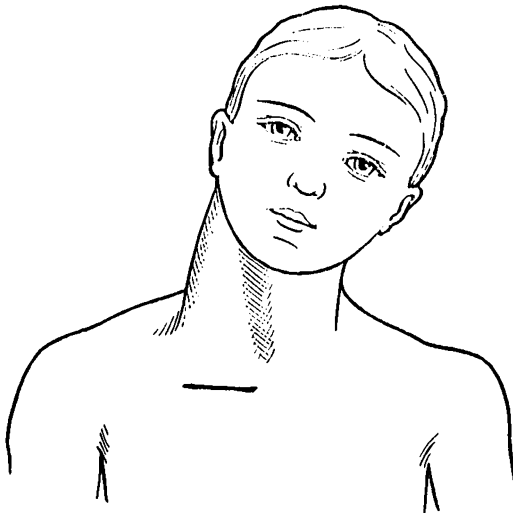
1. M. B. Girl, age eight. Right torticollis — duration since birth — no cause determined. Labor normal. No marked facial atrophy or asymmetry.

Operation, November, 1889. Open incision — both heads of sternomastoid divided. Plaster cuirass.

2. B. B. Girl, age six. Left torticollis — duration since birth — no cause determined. Labor normal. Operation, November, 1889. Myotomy. Plaster.

3. B. B. Girl, age five. Right torticollis — duration since birth — moderately contracted. No marked atrophy or facial asymmetry. Operation, November, 1889. Myotomy with open incision. Plaster. See group photos 12 and 13.

The three cases cited above are most interesting in that they occurred in successive children — all girls — in the same family. There is no family history of any similar previous condition, and there was a normal labor in each case.



Showing line of incision in skin.

The mother writes that the operations "were successful in every way." This was seventeen years after operation.

4. M. Van K. Age ten. Girl. Double torticollis — duration since birth. No further history obtainable. At two years of age she was operated upon in Michigan. Just what was done at that time could not be ascertained. There was a greater degree of contraction on the left side, as compared with the right. The head was thrown forward, and the shoulders elevated. There were no cervical ribs as sometimes occurs in these cases.

Operation, October, 1903. Myotomy with open incision on the left.

Result. — Apparatus. Buckminster-Brown brace worn six months. April 5, 1906. Father writes from Michigan that the operation was a success, and that the head and shoulders are quite straight.

5. N. McD. Girl, age four and three quarters. Torticollis, right. Duration two and one-half years following a fall. Torticollis noticed soon after. Operation, June, 1888. Open incision. Sternomastoid and fascia divided. Plaster for four weeks — followed by Buckminster-Brown brace for four months.

Result. — February, 1907, head in good position deep depression in the right neck, no facial asymmetry, motion all normal. See photo No. 1.

6. H. Boy, age four. Torticollis, right. Duration two years — cause unknown. Considerable tipping of the head to the right with rotation. Marked atrophy of the right face and asymmetry.

Operation. — February, 1895. Open incision, myotomy. This boy died in the hospital later from the measles. The picture is shown to illustrate the atrophy and facial asymmetry. Photo No. 2.

7. O. C. Girl, age eleven. Torticollis, left. Duration nine years, probably congenital.

Operation. — September, 1896. Open incision, myotomy and fasciotomy.

Result. — One year later head straight. Splint omitted. This case has not been heard from since. Photo No. 3 illustrates also the thread screen to show deviation.

8. Wm. D. Boy, age five. Torticollis, right. Duration since birth. No cause assigned. Congenital. Marked contraction of the right sternomastoid muscle.

Operation. — August, 1896. Open incision, myotomy — plaster.

Result. — February, 1907. No facial atrophy or asymmetry. Slight prominence of the left sternomastoid muscle — small hollow above the clavicle on the right. Motions all normal. Head straight. Wore brace two months. See photo No. 4.

9. H. A. Boy, age, four and one half. Torticollis, right. Duration since birth. Forceful delivery. Parents noticed a lump over the right sternomastoid at birth.

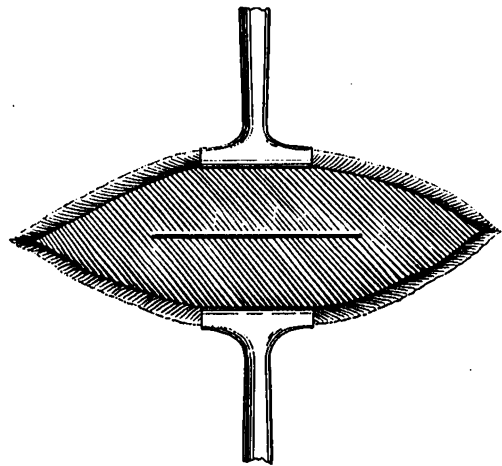
Condition. — Contraction of the right sternomastoid.

Operation. — November, 1899. Open incision. Myotomy both heads of muscle. Plaster four weeks, followed by Buckminster brace which was worn four months.

Present condition. — Head straight, moved freely in all directions. No atrophy of facial asymmetry. See photos Nos. 5 and 6. No. 5 before operation. No. 6, after operation.

10. C. Girl, age eleven and one-half years. Torticollis right. Duration since birth. Marked contraction of sternomastoid muscle — especially the clavicular portion. Only slight facial asymmetry.

Operation. — February, 1900. Open incision. Myotomy. Plaster for one month, and then Buckminster-Brown brace which was worn for seven months.



Incision in fascia.

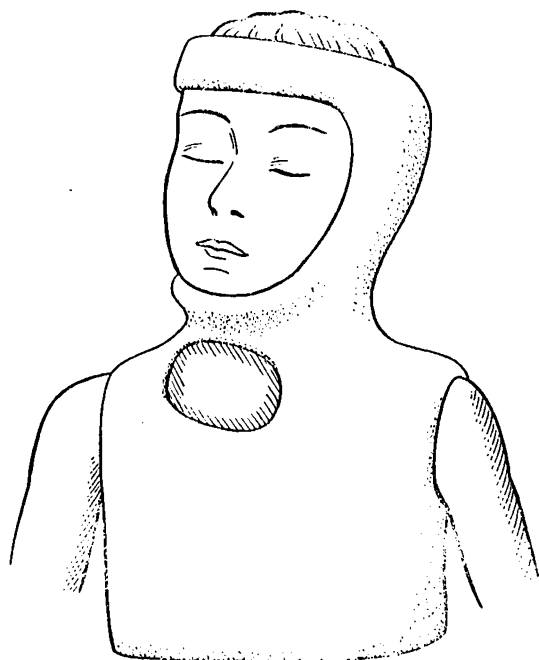
Result. — February, 1907, head nearly straight, still shows a slight tipping to the right. Sternomastoid muscle stands out as a distinct ridge as may be seen in photos Nos. 7 and 8, motions of head free.

11. B. C. Girl, ten years. Torticollis, left. Duration three years following the measles. Considerable contraction of the left sternomastoid muscle, no facial asymmetry.

Operation. — September, 1900. Open incision, myotomy. Plaster for five weeks. Brace, five months.

Result. — February, 1907, head straight in all planes. No asymmetry. Motions all normal. See photo No. 9.

12. E. C. Girl, age eight. Torticollis, left. Duration two years, cause not determined. Presents marked contraction of the left sternocleidomastoid muscle with facial asymmetry and atrophy. There is also a well marked degree of forward resistant shoulders and lateral curvature with reversed rotation.



Post operative plaster cuirasse.

Operation. — August, 1902. Open incision and myotomy. She was put up in a plaster in the usual way and then fitted to a brace. The condition she presents to-day is not wholly satisfactory, for her brace was not worn consistently, which, combined with her lateral curvature and the forward shoulders prevented her complete cure. She is now under treatment for her lateral curvature. See photo No. 10. Photo No. 11 to show over-correction with the Buckminster-Brown brace as applied after an operation for a left-sided torticollis.

All of the acquired forms of torticollis responded as readily to treatment as those of the congenital type. Those cases which were not benefited or had recurrences were in the main due to the unwillingness of the parents to keep the brace on the proper length of time, and to have the child kept under frequent observation at the hospital.

The average length of time during which the child wore the plaster cuirass was about four to six weeks, after which the brace was applied to be worn for about six months, depending upon the individual conditions.

CONCLUSIONS.

In view of the results of the study of this large number of cases, covering such a long period of time, the writers think that the following conclusions may be stated, namely:

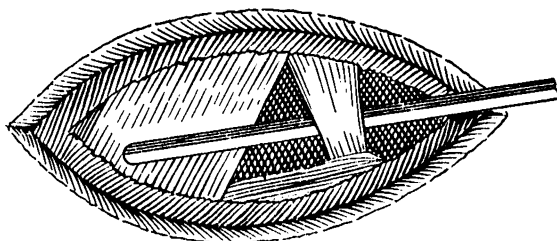
(a) That congenital or acquired muscular torticollis may be cured.

(b) That an open incision, with complete division of the two heads of origin of the sternocleidomastoid muscle, is all that is necessary, except in unusual cases.

(c) That the horizontal incision below the clavicle in the line of the skin cleavage is the best to use, in that it gives adequate room and also gives the best cosmetic results.

(d) That plaster of Paris is the easiest applied, holds the head in the corrected position, and allows ambulatory treatment, and is therefore the best immediate dressing.

(e) That the plaster cuirass should be worn not longer than two months.



Showing division of clavicular and sternal origins.

(f) That the Buckminster-Brown brace, Thomas collar, or wire collar should be worn for an average of four months following the removal of the cuirass.

(g) That it is best to operate on cases between the ages of two and twelve years, to insure a good result, and prevent permanent bony deformity of the face and head.

BIBLIOGRAPHY.

- Mielk, M. J.: Kiel, 1894. Zur Aetiologie des Torticollis Muscularis.
 Whitman: R. Phila., 1891. Observations on Torticollis.
 Kirby, J.: London, 1819. Cases with Observation on Wry Neck.
 Nove Jossierand: Revue d'Orthopédie.
 Vinnay, Chas.: Sept., 1906, No. 5. Path. du Torticollis Cong. Théorie Ischemique.
 Zensus, with Bibliography. Centralbl. für d. Gmsgebiete d. Med. u. Chir., Bd. viii, Nr. 18, Oct., 1905.
 Wetzel: Deut. Zeitschr. für Chir. Bd. xviii, 1883.
 Gerdes: Centralbl. für Chirurgie, Leipsie, No. 6, pp. 145-176. Muscular Torticollis.
 Doering, H.: Behandlung des Caput obstipum. Deut. Med. Wochenschr., xxxii, No. 27.
 Nelaton, Golding Bird, Gallavardin and Savy: Lyon Méd., 1903, p. 767.
 Tubby: London, 1906, p. 185.
 Hoffa: Pp. 195-232.
 Peterson: Zeitschr. für chir. Orthop.
 D'Arcy Power: "The Relationship between Wry Neck and Cong. Hematoma of Sternomastoid."

PLANS for a new building for the medical school of McGill University have been accepted by the Board of Governors, according to the *Medical Record*, and it is expected that the work of construction will commence without delay. The new building will be erected opposite the Royal Victoria Hospital, and is to consist of a central block facing the campus and connected at either side with pavilions running parallel with University Street and Carleton Road.