A COMPOSITE STUDY OF THE SUBCLAVIAN ARTERY IN MAN.

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WITH 7 FIGURES AND 18 TABLES.

Several years ago Hitzrot¹ made a study of the axillary artery based upon records made in the Anatomical Laboratory of the Johns Hopkins University. To supplement this, the following study of the subclavian artery was made at the suggestion of Dr. Harrison. The clinical features relating to the artery are given in another article.²

That there is need for further data concerning the ramifications of this artery is apparent when the accompanying figures, taken from a number of universally recognized authorities, are compared. From them it is seen, that, while certain branches such as the vertebral and internal mammary are represented in the same manner by all, there is the widest divergence with regard to the other branches.

The records which underlie the present study were made by myself, from the dissections by students of anatomy, upon Bardeen's charts.³ Dissections from 129 subjects are recorded, 60 from the left side of the body and 69 from the right side. Some of these records are complete to the minutest detail; nearly all give the origin of the main branches; while a few are incomplete, giving only the subclavian artery and some of its branches, or only a few branches without the subclavian artery. The distribution of the vertebral artery inside the skull was not worked out, because many of the cadavers were not obtained until after the brain had been removed. The distribution of the internal mammary artery was worked out completely in but 28 cases because of the removal of the sternum at the autopsy in the others.

¹ Hitzrot, Johns Hopkins Hospital Bulletin, Vol. XII, 1901.

² Bean, Johns Hopkins Hospital Bulletin, Vol. XV, 1904.

³ Bardeen, Outline Record Charts, Johns Hopkins Press, Baltimore, 1900.
AMERICAN JOURNAL OF ANATOMY.—VOL. IV.

FIG. 1. Branches of the subclavian artery according to different authors. *A*, according to Quain, Testut and Gray; *B*, according to Henle; *C*, according to Tiedemann; *D*, according to Spalteholz and Toldt (B. N. A); *E*, according to Gegenbaur; *F*, according to Sappey.

The lettering on all the figures is alike and as follows: I, II and III, the three parts of the subclavian artery; *A. V.*, arteria vertebralis; *A. M. I.*, arteria mammaria interna; *T. T. C.*, truncus thyreo-cervicalis; *A. T. I.*, arteria thyroidea inferior; *A. T. S.*, arteria transversa scapula; *A. T. C.*, arteria transversa colli; *R. A. T. C.*, ramus ascendens transversa colli; *R. D. T. C.*, ramus descendens transversa colli; *A. C. S.*, arteria cervicalis superficialis; *A. C. A.*, arteria cervicalis ascendens; *T. C. C.*, truncus costo-cervicalis; *A. I. S.*, arteria intercostalis suprema; *A. C. P.*, arteria cervicalis profunda; *C. T.*, common trunk.

While numerous variations in the origin and distribution of the branches of the artery are observed in my study, it is nevertheless possible to classify the cases, for they are found to fall naturally into a number of distinct types. In section A of this work it is proposed to describe these types. This will be followed in section B by a description of the origin and distribution of the individual branches, while in section C the results of the present study will be discussed in their relation to the previous work upon the subject, and illustrative tables will be appended.

FIG. 2. Type I, occurring in 30% of the specimens, 22% on the right side, and 8% on the left side of the body. For index to lettering see Fig. 1.

The three divisions of the subclavian artery referred to throughout this work are: Part I, that portion medial to the scalenus anticus muscle; Part II, posterior to it; and Part III, lateral to this muscle.

The records given are from 74 male Negroes, 16 female Negroes, 21 male Caucasians and 3 female Caucasians. The race and sex are not determined in 15 subjects. The Negroes are the American variety, and possibly all of them have a trace of the Caucasian mixed with the Negro, the proportion in any case being uncertain.

SECTION A.—TYPES OF RAMIFICATION.

The mode of ramification of the subclavian artery is found to be divided into five types, depending upon the origin of the large branches. The distribution of these branches is practically the same in all cases.

Type I (Fig. 2) occurs in 30% of the cases classified, 22% being on the right side of the body and 8% on the left side. In this type the vertebral and internal mammary arteries rise from Part I; the inferior thyroid and suprascapular arteries rise from a common trunk which comes from Part I, and between these two arteries rises the superficial

FIG. 3. Type II, occurring in 27% of the specimens, 22% on the left side, and 5% on the right side of the body. For index to lettering see Fig. 1.

cervical artery; the ascending cervical artery rises from the inferior thyroid; and the transverse cervical artery and the costo-cervical trunk rise from Part II. Each of the branches often has a separate origin. There are in this type 19 male negro subjects, 2 female negro subjects, 5 male white subjects, 2 female white subjects, and 4 subjects in which the sex and race are not determined.

Type II (Fig. 3) is found in 27% of the cases classified, 22% being on the left side of the body and 5% on the right side. The vertebral

and internal mammary arteries rise from Part I; the inferior thyroid, suprascapular and transverse cervical arteries rise from a common trunk which comes from Part I, and is known as the thyroid axis; the superficial cervical artery is absent, its place being taken by small branches from the transverse cervical artery; the ascending cervical artery rises from the inferior thyroid artery, as it does in practically all the cases of all the types; and the costo-cervical trunk rises from Part II. The internal mammary artery rises from the thyroid axis five times in this type—four times in infants—showing a bunching of the branches.

FIG. 4. Type III, occurring in 22% of the specimens. For index to lettering see Fig. 1.

There are in this type 18 male negro subjects, 2 female negro subjects, 3 male white subjects, 1 female white subject, and 1 subject in which the sex and race are not determined. Types I and II are the representative types for the right and left sides of the body respectively. Cf. Fig. 7, A and B, pp. 314 and 315.

Type III (Fig. 4) with slight variations occurs in 22% of the cases classified, 25 times in all, 13 on the right side of the body and 12 on the left side. The vertebral and internal mammary arteries, and the costo-cervical trunk rise from Part I in this type and in the two remaining

types. The inferior thyroid artery rises from Part I, the transverse cervical artery rises from Part II, and the suprascapular artery rises from Part III, or from the axillary artery (9 times). This type may be considered a subtype of the first, Type I, showing the extreme separation of the origin of the branches and no bunching. There are in this type 11 male negro subjects, 4 female negro subjects, 7 male white subjects, and 3 subjects in which the sex and race are not determined.

Type IV (Fig. 5) is found in 12% of the cases classified, 14 times in all, present in equal number on each side of the body. The inferior thy-

FIG. 5. Type IV, occurring in 12% of the specimens. For index to lettering see Fig. 1.

roid artery rises with a common trunk from Part I. From the common trunk rise the suprascapular and transverse cervical arteries. This type may be considered as a subtype of the second, Type II, in which the branches are often bunched. There are in this type 4 male negro subjects, 3 female negro subjects, 3 male white subjects, and 4 subjects in which the sex and race are not determined.

Type V (Fig. 6) occurs in 10% of the cases classified. The inferior thyroid and superficial cervical arteries rise by a common trunk from

Part I; the suprascapular artery rises from the internal mammary artery. The type is of interest from this fact and because of its frequent occurrence in the cases studied.

SECTION B.—DESCRIPTION OF THE INDIVIDUAL BRANCHES.

In its origin the *vertebral artery* is the most constant of all the branches of the subclavian artery. It arises in every case, with three exceptions, from the posterior and superior aspect of Part I, and is the first and largest branch. It is associated with other arteries in its origin

FIG. 6. Type V, occurring in 10% of the specimens. For index to lettering see Fig. 1.

from a common trunk but four times, with the inferior thyroid three times, and the thyroid axis once. It comes from the arch of the aorta between the origin of the left common carotid and the left subclavian arteries three times. In one case on the right side the vertebral artery is double, two small arteries arising from Part I and entering the 6th vertebral foramen together. The artery enters the 4th foramen once; the 5th, 4 times; the 6th, 88 times; and the 7th, 4 times. Tiedemann states that this artery enters any one of the vertebral foramina from the

1st to the 7th, most frequently the 6th, and most infrequently the 7th. He also mentions a double vertebral artery, one arising from the inferior thyroid artery, the other from the subclavian, uniting at the 4th cervical vertebra. Quain gives a chart of a similar double vertebral artery.⁴

The internal mammary artery arises alone from Part I in 80% of the cases, and is associated with other arteries by origin in a common trunk in 20% of the cases, arising with the thyroid axis in 10% of the latter, with the suprascapular in 10% of them, and with the transverse cervical and suprascapular once. The distribution of the artery is worked out in minute detail only 28 times. A lateral thoracic artery is found five times in the 28. It is as large as the internal mammary, is derived from the latter close to its origin from the subclavian, and passes between the parietal pleura and the ribs along the anterior axillary line, sending branches into the intercostal spaces from the 1st to the 9th, and losing itself in one of these spaces or in the diaphragm. A lateral thoracic artery is mentioned by Quain, Tiedemann, Henle, and other anatomists, but is given as a very rare anomaly. Intercostal branches come from the internal mammary as single arteries posterior to the intercostal spaces, sending one branch to the superior part and another to the inferior part of the spaces; or they arise posterior to the costal cartilages, sending a branch above and one below the adjoining rib; or there are two intercostal branches to each space, one below the rib above it, the other above the rib below it. Any two or all three of these arrangements may be found on one side of a subject. In 54% of the subjects there are two branches to each intercostal space, in 46% only one.

The thyroid axis is found as shown in Type I, Fig. 2, in 30% of the cases, 22% of these being on the right side of the body, and 8% on the left side. It is present as shown in Type II, Fig. 3, in 27% of the cases, 22% of these being on the left side of the body, and 5% on the right side. Quain and Gray give Type II as normal. Tiedemann, Henle, Gegenbaur, Sappey, Testut and other French and German anatomists give Type I as the most frequent.

*The inferior thyroid artery*⁵ arises as shown in Type I in 35% of the subjects; it arises from Part I as a single branch in 33% of the subjects, and as shown in Type II, in 32% of the subjects.

*The suprascapular artery*⁶ arises as shown in Type I in 36% of the subjects; in Type II in 34%, and from the subclavian alone as a single branch in 30% of them.

This artery is absent 4 times, double 3 times, and very small 4 times. The long thoracic artery arises from it once.

⁴ Table 2, p. 318.

⁵ Table 3, p. 318.

⁶ Table 5, p. 319.

The transverse cervical artery arises from Part II in 39% of the subjects, from Part I in 36% of the subjects (alone or with the thyroid axis), and from Part III, or from the axillary artery in 25% of them. Quain gives the most frequent origin of the transverse cervical artery from the thyroid axis, dividing into the posterior scapular and superficial cervical; the next in frequency being the posterior scapular from Part III and the superficial cervical from the thyroid axis; the least frequent mode of origin being from Part III, and dividing into posterior scapular and superficial cervical arteries. We found the following approximately:

The transverse cervical artery arises on the right side from Part II, dividing into ascending [superficial cervical (?)] and descending (posterior scapular) rami, and on the left side from the thyroid axis, dividing into ascending and descending rami, having previously given off the superficial cervical artery. The ascending ramus of the transverse cervical artery arises lateral to the levator scapulæ muscle, and, dividing almost immediately, sends one branch parallel to the *superior* lateral border of the trapezius and beneath it to the occiput. The other branch passes parallel to the *inferior* lateral border of the same muscle and beneath it to the level of the seventh thoracic vertebra, sending a large branch to the rhomboid muscles. The descending ramus follows the prescribed course of the posterior scapular artery as given in English and American text-books. The relation of the two sides of the body with reference to the origin of the transverse cervical artery shows the two sides alike in 29 subjects, unlike in 13. In 10 of the latter the artery arises from Part II on the right side, and from the thyroid axis on the left side.

The superficial cervical artery^{*} is considered to be a branch that passes from the transverse cervical artery in 60% of the subjects, from the inferior thyroid artery in 22% of the subjects, and from the suprascapular artery in 18% of the subjects, terminating just beneath the lateral border of the trapezius muscle. The artery is more commonly a number of small branches arising along the transverse cervical artery as it traverses the neck. The ascending ramus of the transverse cervical artery is described by some anatomists as the superficial cervical artery (Quain).

The costo-cervical trunk[†] a small short artery, arises from Part I in 90% of the subjects; from Part II in 9% of the subjects, and from

[†] Tables 6, 7, and 8, p. 319.

^{*} Table 9, p. 320.

[°] Tables 10 and 11, p. 320.

Part III in 1% of them, dividing almost immediately into the superior intercostal and the deep cervical arteries. The origin from Parts II and III is on the right side of the body in all cases.

*The superior intercostal artery*¹⁰ arises on the right side of the body from the costo-cervical trunk in 41% of the subjects; from Part II in 10% of the subjects, and from Part I in 3% of them. It arises on the left side of the body from the costo-cervical trunk in 38% of the subjects, and from Part I in 8% of them.

*The deep cervical artery*¹¹ arises from the costo-cervical trunk in 83% of the subjects; from the subclavian artery in 13% of them, and from the inferior thyroid in 4% of them. It passes above the first rib in 82% of the subjects, and below it in 18% of them. The distribution of the deep cervical artery varies in inverse proportion to that of the ascending cervical and the superior intercostal arteries.

SECTION C.—DISCUSSION.

First.—We have demonstrated that the branches are arranged in a different manner on the two sides of the body. Fig. 7 shows this.

This figure represents the most usual arrangement of the branches of the subclavian artery as found on each side of the body, the difference between the two sides of the body being chiefly in the origin of the transverse cervical artery.¹² The type shown on the right side of the body occurred in 51% of all the cases classified on that side. The type shown on the left side of the body occurred in 55% of all the cases classified on that side. The distribution of the anterior branches is put on the right side of the body, and that of the posterior branches on the left side of the body in this figure.

Second.—The number of branches arising from Part II on the right side is more than double those from the same part on the left side, counting all cases. This is due to the origin of the transverse cervical artery and occasionally (11 times) the superior intercostal artery from Part II on the right side.¹³

Third.—The relation of the branches to *age* discloses the apparent abnormality of infantile subclavian arteries. There are 23 infant subjects worked out, 17 male negro, 4 female negro, and 2 male white. No two subjects show the same arrangement, all being irregular.

¹⁰ Table 10, p. 320.

¹¹ Table 11, p. 320.

¹² Tables 12, 13, 14, 15, and 16, pp. 320, 321, 322, and 323.

¹³ Tables 5, 10, 13, and 14, pp. 319, 320, and 321.

Two striking features are noticed. In the first place there seems to be a tendency for the branches to be bunched from Part I. The internal mammary artery arises 4 times with the thyroid axis, and the suprascapular artery arises twice from the internal mammary artery. In the second place the suprascapular artery is small in five cases, and does not extend beyond the suprascapular notch in these cases, its place being taken by the dorsal scapular artery. There are 2 other cases with inosculation around the neck of the scapular between these two arteries, the suprascapular being like a continuation of the dorsal scapular artery. Knowledge of the previous condition of the subject as to age, habits, and family history, and dissection of subjects that had died at the ages of 1, 5, 10, 15, 20, and 25 years, etc., would be of value in studies similar to this one.

Fourth.—There are 74 male negro and 16 female negro subjects, and 21 male white and 3 female white subjects from which records were made. In 15 subjects the race and sex are not determined. In view of the small number of female and white subjects, the relation of sex and race will hardly admit of discussion. Many of the subjects are mulattoes, or mixed bloods. The number of anomalies, variations, and queer types is uncommonly large.

May we not explain the occurrence of this large number of abnormalities by the well-known biological law that hybrids tend toward variation? The question is an open and an interesting one.

Fifth.—Free anastomoses by a definite arterial trunk were found in connection with the suprascapular, deep cervical and superior intercostal arteries. The suprascapular artery *inosculates* with the dorsal scapular artery posterior to the neck of the scapula, 17 times, or in 16% of all cases. The trunk was from 2 to 5 mm. in diameter. The superior intercostal artery anastomoses with the superior aortic intercostal artery 31 times, in every case where it is looked for. The anastomosis is found to take place:

At the second intercostal space	16 times
At the third intercostal space.....	10 times
At the fourth intercostal space.....	5 times

The trunk is very small, only a minute tube in some cases. The deep cervical, “*profunda cervicis*,” anastomoses with the “*princeps cervicis*” from the occipital in 11 cases, 10% of all. The trunk is of good size, frequently about 5 mm. in diameter.

Sixth.—Anomalies when present are found as a rule on each side of the same subject. The most frequent anomaly met with in the dissec-

FIG. 7-A. The right subclavian artery. See Fig. 1 for index to lettering.

FIG. 7-B. The left subclavian artery of the same body as Fig. 7-A. See Fig. 1 for index to lettering.

tions is the suprascapular artery arising from the internal mammary artery (see Fig. 6). This occurs 12 times in 104 cases (practically 12%). Quain¹⁴ found the same anomaly 4 times in 264 dissections of the subclavian artery (about 1%). Arthur Thomson¹⁵ found it 9 times in 544 cases (less than 2%). Another anomaly is found in connection with the internal mammary artery. The latter divides into two branches a few cm. from its origin, one of which takes the normal course of the internal mammary artery, while the other follows the anterior axillary line between the ribs and pleura, terminating at the diaphragm in two cases, at the fourth rib in three other cases. This branch is as large as the ordinary internal mammary artery, and sends branches into the intercostal spaces just as that artery does. This "lateral thoracic artery" is present 5 times in 28 cases (18%) that are carefully worked out. Anatomists mention this anomaly, but consider its occurrence much rarer than our findings indicate. Another important anomaly is observed twice. The anomaly is in the trunks arising from the arch of the aorta. The first trunk divides immediately at the aorta into the two common carotid arteries. The second trunk is the left subclavian artery. The third trunk is the right subclavian artery. This arises from the distal part of the aortic arch on a level with the fourth thoracic vertebra, and passes posteriorly between the œsophagus and the vertebral column to its usual place on the right side. The right recurrent laryngeal nerve passes directly to its distribution, without looping around the subclavian artery. The pneumogastric and phrenic nerves occupy their usual places and relations. This anomaly has been reviewed by Gotthold Holzapfel,¹⁶ who collected 200 cases from the literature, including 4 of his own (1 in an animal). He concludes that this anomaly occurs 6 times in every 1000 cases. Quain and other anatomists fixed the ratio at 4:1000. Tiedemann gives the ratio 8:1000, nearly 1%. The middle thyroid artery, "Thyroidea Ima," another anomaly, is found three times. It arises from the innominate artery, and, passing to the median line, supplies the lower lobes of the thyroid gland and the isthmus. Wenzel Gruber¹⁷ records 125 anomalies of this kind, and concludes that the artery rises most frequently from the innominate artery, but also not infrequently comes from the aorta and the common carotid artery. He found it 16 times in 100 consecutive dissections.

¹⁴ Quain, *Commentaries on the Arteries*, London, 1844.

¹⁵ Thomson, *Second Report of the Collective Investigation of the Anatomical Society of Great Britain and Ireland. Journal of Anatomy and Physiology*, London, Vol. XXVI, p. 78.

¹⁶ Holzapfel, *Anatomische Hefte*, XII, I part, p. 373 (1897).

¹⁷ Gruber, *Virchow's Archiv*, Vol. 54, p. 445.

SUMMARY.

I. The branches of the subclavian artery differ in their origin on the two sides of the body, the most frequent arrangement being similar to Type I on the right side, and Type II on the left side.

(a). The thyroid axis, dividing into the suprascapular, transverse cervical, and inferior thyroid arteries, is not normal, except on the left side.

(b). The transverse cervical artery and the costo-cervical trunk arise from the second part of the subclavian artery more frequently on the right side than on the left side.

(c) The superficial cervical artery is of infrequent occurrence, and is found more often on the right side. See Type I.

(d). The transverse cervical artery terminates by dividing into ascending and descending rami, the latter being commonly called the posterior scapular artery. The former divides underneath the trapezius muscle and supplies the upper and middle part of the back.

(e). There is a tendency in the branches of the subclavian artery to bunch themselves in their origin on the left side, whereas on the right side there is a tendency in each branch to arise directly from the subclavian artery.

II. There are five important, and not infrequent, anomalies to which the attention is directed:

(a) The origin of the right subclavian artery from the descending part of the arch of the aorta. This occurs 4-6-8 times in 1000 cases (0.5% to 1% of all persons).

(b). Variableness in the origin of the transverse cervical artery, especially on the right side.

(c). The presence of a middle thyroid artery (Thyroidea Ima).

(d). The suprascapular artery arising from the internal mammary artery.

(e). The lateral thoracic artery arising from the internal mammary artery.

III. Eighty per cent of the dissections were made in negro subjects, a large number of whom may have been mulattoes or mixed bloods. That hybrids tend toward variation is a recognized biological law. This may explain the unusually large number of abnormalities encountered.

IV. Twenty-three infants were dissected and many of these show irregularities, particularly in the distribution of the suprascapular artery, which is frequently deficient, its place being taken by the dorsal scapular artery.

V. The branches of the subclavian artery may be more numerous in adults than in infants. The branches rise from all parts of the artery in adults, whereas in infants the branches frequently rise in a bunch from Part I.

TABLE 1.¹

THE ORIGIN OF THE ARTERIA MAMMARIA INTERNA (INTERNAL MAMMARY ARTERY).

Origin.	Quain.	Bean.
From Part I	.935	.806
From Part II	.003	.000
From Part III	.020	.000
From the truncus thyreo-cervicalis.....	.050	.097
From a common trunk with the A. trans. scap. and the A. trans. colli. .	.015	.007
From a common trunk with the A. transversa scapulæ.....	.012	.090

TABLE 2.

SHOWING THE ARTERIES THAT COMPOSE THE TRUNCUS THYREO-CERVICALIS (THYROID AXIS) IN THE DIFFERENT TYPES.

Truncus thyreo-cervicalis composed of	Type I Fig. 2.	Type II Fig. 3.	Type III Fig. 4	Type IV Fig. 5.	Not Classified.
A. thyroidea inferior	1	1	1	1	0
A. transversa colli	0	1	0	} 1	0
A. transversa scapulæ	1	1	0		0
T. t. c. gives off A. mammaria interna..	0	0	0	0	1
Frequency of each type—Thomson.....	.417	.413	.060	.064	.044
Frequency of each type—Bean	.273	.257	.273	.120	.077

TABLE 3.

THE ORIGIN AND ANOMALIES OF THE A. THYROIDEA INFERIOR (INFERIOR THYROID ARTERY).

Origin.	Thomson.	Quain.	Bean.
As shown in Type I.....	.432	...	.296
As shown in Type II.....	.430	.900	.277
As shown in Type IV.....	.036	...	.129
From Part I (alone), as a single branch.....	.095	.101	.287
From the A. carotis communis	.001	.003	.000
From the A. thyroidea ima.....	.001	.011	.009
With the A. transversa colli.....	.038	.005	.065
With the A. mammaria interna	...	...	.046
With the A. vertebralis	.005	.001	.027
With the A. occipitalis	...	.018	.009
With the A. cervicalis superficialis.....	.053	.025	.074
With the A. cervicalis profunda.....	...	...	.027
Anomalies.			
Absent	...	.022	.018
Very large—larger than the A. subclavia.....	...	.011	.027
Very small—not supplying the gland.....	...	.014	.065
One branch to the gland.....	...	...	.046
Two branches to the gland.....	...	...	.954
Forming both the A. occipitalis and the A. vertebralis.....	...	...	.009

¹ The figures in the tables are all given in percentages or may be considered as the number of times per thousand by removing the decimal point.

TABLE 4.

THE ORIGIN OF THE A. CERVICALIS ASCENDENS (ASCENDING CERVICAL ARTERY).

Origin.	Thomson.	Bean.
From the A. thyroidea inferior	.902	.656
From the truncus thyreo-cervicalis	.030	.099
From the A. transversa colli.....	.022	.091
From the A. cervicalis superficialis	.038	.077
From Part I	.004	.054
From the A. transversa scapulæ	.002	.015

TABLE 5.

THE ORIGIN OF THE A. TRANSVERSA SCAPULÆ (SUPRASCAPULAR ARTERY).

Origin.	Thomson.	Quain.	Bean.
From Part I, with other arteries or alone.....	.776	.885	.813
From Part II, with other arteries or alone.....	.024	.015	.042
From Part III, with other arteries or alone.....	.074	.088	.101
From the A. axillaris.....	.015	.015	.042
From the A. subclavia alone (as a single trunk).....	.057	.167	.219
With the A. transversa colli.....	.080	.080	.118
With the A. mammaria interna.....	.016	.020	.101
With the A. subscapularis	...	.005	.017
Double	.015	...	.025

TABLE 6.

THE ORIGIN OF THE A. TRANSVERSA COLLI (TRANSVERSE CERVICAL ARTERY).

Origin.	Thomson.	Quain.	Bean.
From Part I, with other arteries or alone.....	.508	.429	.365
From Part II, with other arteries or alone.....	.014	.191	.390
From Part III, with other arteries or alone.....	.477	.380	.245
With the A. transversa scapulæ.....	.079	.048	.145
With the A. thyroidea inferior	.036	...	.072
With the A. thoracalis lateralis.....	...	...	.012
Double	.005	...	.012

TABLE 7.

THE ORIGIN OF THE RAMUS DESCENDENS (POSTERIOR SCAPULAR ARTERY).¹

Origin.	Deaver. ¹	Thomson.	Quain.	Bean.
From Part I	...	...	.003	...
From Part II	.005	.008	.150	...
From Part III.....	.023	.508	.353	.046
From the A. transversa colli.....	.968	.484	.480	.918
From the A. axillaris	.001	...	...	.009

TABLE 8.

THE ORIGIN OF RAMUS ASCENDENS (NOT GIVEN BY THOMSON OR QUAIN).

Origin.	Bean.
From Part I	.030
From Part II	.010
From Part III.....	.030
From the A. transversa colli.....	.730
From the truncus thyreo-cervicalis or its branches.....	.200

¹ Deaver, Anomalies of the Posterior Scapular Artery, University Medical Magazine, Phila., Vol. II, p. 151, 1889.

TABLE 9.

THE ORIGIN OF THE A. CERVICALIS SUPERFICIALIS (SUPERFICIAL CERVICAL ARTERY).

Origin.	Thomson.	Quain.	Bean.
From the A. transversa colli	.589	.963	.590
From the A. thyroidea inferior	.312	.004	.220
From the A. transversa scapulæ	.092	.026	.190
From the A. subclavia	.002	.008	...

TABLE 10.

THE ORIGIN OF THE A. INTERCOSTALIS SUPREMA (SUPERIOR INTERCOSTAL ARTERY).

Origin.	Quain.		Bean.	
	Right.	Left.	Right.	Left.
From Part I	.086	.220	.030	.075
From Part II.....	.482	.194	.105	...
From the truncus costo-cervicalis	...	...	.400	.370
From the A. vertebralis	.007	...	.020	...
From the A. thyroidea inferior.....	.004	...	...	...

TABLE 11.

THE ORIGIN OF THE A. CERVICALIS PROFUNDA (DEEP CERVICAL ARTERY).

Origin.	Quain.	Bean.
From the truncus costo-cervicalis	...	.820
From the A. intercostalis suprema	.932	...
From the A. subclavia	.049	.130
From the A. thyroidea inferior.....	...	.040
From the ramus descendens	.018	.010
The artery passes:		
Above the first rib.....	.936	.820
Below the first rib.....	.064	.180

TABLE 12.

A COMPARISON OF THE MOST FREQUENT ORIGIN OF THE BRANCHES ON THE TWO SIDES OF THE BODY.

Artery.	RIGHT SIDE.		LEFT SIDE.	
	Origin.	%	Origin.	%
From:			From:	
Vertebralis	Part I	97	Part I	88
Mammaria interna	Part I	95	Part I	82
Truncus thyreo-cervicalis...	Part I (5 times)	11	Part I (25 times)	45
Thyroidea inferior	Part I	74	Truncus thyreo-cervicalis	45
Transversa scapulæ	Part I	54	Truncus thyreo-cervicalis	45
Transversa colli	Part II	54	Truncus thyreo-cervicalis	49
Ramus asc. A. tr. colli ...	Part II	66	Truncus thyreo-cervicalis	80
Ramus desc. A. tr. colli ...	A. tr. colli.....	97	A. transversa colli.....	90
Cervicalis superficialis	A. tr. colli.....	45	A. transversa colli.....	76
Cervicalis ascendens	A. thyroidea inferior...	70	A. thyroidea inferior...	70
Truncus costo-cervicalis	Part I	78	Part I	100
Intercostalis suprema	Tr. costo-cervicalis.	86	Tr. costo-cervicalis	80
Cervicalis profunda	Tr. costo-cervicalis	82	Tr. costo-cervicalis	77

TABLE 13.

COMPARISON OF THE NUMBER OF BRANCHES FROM EACH PART OF THE SUBCLAVIAN ARTERY ON THE TWO SIDES OF THE BODY.

	Right.	Left.
Part I	80%	83%
Part II	11%	5%
Part III.....	8%	9%
A. axillaris	2%	3%

TABLE 14.

THE PERCENTAGE OF BRANCHES FROM PARTS II AND III OF THE SUBCLAVIAN ARTERY.

	Part II.		Part III.	
	Quain.	Bean.	Quain.	Bean.
None	19%	67%	54%	66%
One	67% ¹	24%	46% ¹	24%
Two	12%	8%	3%	4%
Three	9%	7%	8%	8%

¹ Quain counted a muscular twig which was not counted in this work.

TABLE 15.
ORIGIN OF THE BRANCHES OF THE SUBCLAVIAN ARTERY ON THE LEFT SIDE OF THE BODY.

	Part I A. subclavia.	Part II A. subclavia.	Part III A. subclavia.	Truncus thyreo-cervicalis.	A. thyroidea inferior.	A. transversa scapulae.	A. transversa colli.	Truncus costo-cervicalis.	Arch of aorta.	Base of A. subclavia.	Common trunk.	Double arteries.	Absent.	No. arteries worked out.
A. vertebralis	53	.	.	.	1	.	.	.	3	1	1	.	.	58
A. mammaria interna	47	.	.	10	.	.	.	.	.	.	12	.	.	57
Truncus thyreo-cervicalis	25	.	.	.	.	.	.	.	.	.	.	.	28	25
A. thyroidea inferior	31	.	.	25	.	.	.	.	.	.	44	.	1	56
A. transversa scapulae	20	2	9	25	.	.	.	.	.	.	47	3	4	59
A. transversa colli	2	12	12	25	.	.	.	.	.	.	36	.	.	51
Ramus ascendens A. trans. colli.	.	1	.	1	4	4	41	.	.	.	2	.	3	51
Ramus descendens A. trans. colli.	1	.	5	.	.	.	45	.	.	.	.	.	.	51
A. cervicalis superficialis	.	.	.	.	9	5	37	.	.	.	.	.	.	51
A. cervicalis ascendens	3	.	.	4	44	2	7	.	.	.	.	6	.	66
Truncus costo-cervicalis	46	.	.	.	.	.	.	.	.	.	.	.	9	46
A. intercostalis suprema	8	.	.	.	.	.	.	39	.	.	.	.	.	48
A. cervicalis profunda	9	.	.	.	3	.	.	40	.	.	.	.	.	52
Total	245	15	26	90	61	11	133	79	3	1	142	9	45	671

TABLE 16.
ORIGIN OF THE BRANCHES OF THE SUBCLAVIAN ARTERY ON THE RIGHT SIDE OF THE BODY.

	Part I A. subclavia.	Part. II A. subclavia.	Part. III A. subclavia.	Truncus thyreo-cervicalis.	A. thyroidea inferior.	A. traversa scapulæ.	A. transversa collis.	Truncus costo-cervicalis.	Common trunk.	Double arteries.	Absent.	A. cervicalis superficialis.	No. arteries worked out.
A. vertebrales	66	..	..	..	1	..	..	1	2	1	..	..	69
A. mamma interna	61	..	..	3	..	..	..	..	6	..	..	..	64
Truncus thyreo-cervicalis	5	..	..	..	..	..	..	..	..	..	42	..	5
A. thyroidea inferior	45	..	..	5	..	..	..	..	35	..	1	..	50
A. transversa scapulæ	32	3	8	5	..	..	..	..	44	..	..	..	48
A. transversa colli	4	26	12	5	..	..	..	..	21	1	..	..	48
Ramus ascendens A. trans. collis	3	..	3	2	4	6	35	..	3	..	6	..	53
Ramus descendens A. trans. collis	1	..	..	..	..	..	57	..	7	1	..	..	59
A. cervicalis superficialis	..	..	..	..	14	15	24	..	..	..	..	..	53
A. cervicalis ascendens	4	..	..	9	39	..	5	..	8	..	..	1	57
Truncus costo-cervicalis	45	10	1	..	..	..	..	..	1	2	..	..	58
A. intercostalis suprema	3	11	3	..	..	..	..	42	..	..	..	..	59
A. cervicalis profunda	5	..	..	..	1	..	..	45	1	..	..	..	51
Total	273	50	27	29	59	21	121	88	128	5	49	1	674

In the above tables truncus thyreo-cervicalis is considered to divide into three branches—A. thyroidea inferior, A. transversa collis, and A. transversa scapulæ.

TABLE 17.
THE DISTRIBUTION OF THE BRANCHES OF THE SUBCLAVIAN ARTERY.

[illegible]

TABLE 18.

MUSCLES SUPPLIED BY THE SUBCLAVIAN ARTERY, WITH THE BRANCHES SUPPLYING THEM.

M. platysma:

Almost constant.....	{ A. cervicalis superficialis. A. cervicalis ascendens.
Frequent.....	{ A. thyroidea inferior. A. transversa scapulæ. A. transversa colli.
Occasional.....	{ A. subclavia, Part I. Twigs. Truncus thyreo-cervicalis. Twigs.

M. trapezius:

Constant.....	{ R. ascendens transversa colli. Two or more large branches passing between trapezius and rhomboids. R. descendens transversa colli. Several small branches. Some twigs after passing rhomboids. A. cervicalis superficialis. Several small branches.
Frequent.....	{ A. transversa scapulæ. One large branch just at bend to drop over scapula.
Occasional.....	{ A. cervicalis ascendens. Small branches. A. subclavia. Small branches.

M. rhomboids, and serratus posterior:

Constant.....	{ R. descendens transversa colli. One large branch under rhomboids (anterior), and several smaller ones into the muscles.
Frequent.....	{ R. ascendens transversa colli from inferior branch be- tween rhomboids and trapezius.
Occasional.....	{ A. cervicalis superficialis. Small branch or branches. A. cervicalis profunda. Small branch or branches. A. subclavia. Small branch or branches.

M. levator scapulæ:

Constant.....	{ R. ascendens transversa colli. Small branches. R. descendens transversa colli. Small branches. A. cervicalis superficialis. Small branches.
Frequent.....	A. cervicalis ascendens. One large, several small branches.
Occasional.....	A. transversa scapulæ. Small branch.
Rare.....	A. cervicalis profunda. Small branch.

M. serratus anterior:

Constant.....	R. descendens transversa colli. Small branches.
Frequent.....	R. ascendens transversa colli. Small branches.
Occasional.....	A. transversa scapulæ. Small branches.

M. supraspinatus:

Constant.....	{ A. transversa scapulæ. One large branch. R. descendens transversa colli. Several small branches.
Occasional.....	A. circumflexa scapulæ. One large branch.

M. infraspinatus:

Constant..... { A. transversa scapulæ. One large branch.
R. descendens transversa colli. Several medium branches.
Frequent..... A. circumflexa scapulæ. One large branch.

M. latissimus dorsi:

Constant..... { R. descendens transversa colli.
A. subscapularis.

M. subscapularis:

Constant..... R. descendens transversa colli.
Frequent..... A. transversa scapulæ.

M. sternocleido-mastoideus:

Constant..... { A. transversa scapulæ. Small and medium branches.
A. cervicalis superficialis. Small and medium branches.
A. cervicalis ascendens. Small and medium branches.
Frequent..... { Truncus thyreo-cervicalis. Small and medium branches.
A. thyroidea inferior. Small and medium branches.
Rare..... R. descendens transversa colli.

M. omohyoideus:

Constant..... { A. cervicalis superficialis, or branches from.
A. transversa colli.
Frequent..... A. transversa scapulæ.
Occasional..... { A. thyroidea inferior.
A. cervicalis ascendens.
Rare..... A. subclavia. Three times.

M. sterno-hyoideus, and sterno-thyroideus:

Constant or frequent..... A. thyroidea inferior.
Occasional..... A. transversa scapulæ.
Rare..... A. subclavia.

M. scalenus anterior, medius, and posterior:

Constant..... { A. cervicalis ascendens. Many branches.
Truncus costo-cervicalis, or its branches.
A. intercostalis suprema (R. dorsalis).
A. cervicalis profunda.
Frequent..... { A. cervicalis superficialis, or branches from.
A. transversa colli.
Occasional..... R. ascendens and descendens transversa colli.
Rare..... A. subclavia.

M. longus colli:

Constant..... { A. cervicalis ascendens.
Truncus costo-cervicalis, or its branches.
A. intercostalis suprema.
A. cervicalis profunda.
Frequent..... A. thyroidea inferior.
Rare..... A. subclavia.

M. longus capitis:

Constant..... A. cervicalis ascendens.

M. splenius capitis, and cervicis:

Constant..... { A. cervicalis profunda. Through complexus M.
A. princeps cervicis. Many small branches.

Frequent..... { R. ascendens transversa colli. Several medium branches
between M. splenii and trapezius.

Occasional..... { A. cervicalis superficialis. Several medium branches be-
tween M. splenii and trapezius.

Rare..... { A. cervicalis ascendens. Branch through above fifth ver-
tebra takes the place of A. cervicalis profunda.

M. semispinalis capitis and longissimus capitis (complexus, and trachelo mastoid):

Constant..... { A. cervicalis profunda. Many medium branches beneath
the muscles.
A. princeps cervicis. Many medium branches beneath the
muscles.
A. vertebralis. Many medium branches beneath the
muscles.

Frequent..... { R. ascendens transversa colli. Around edge of splenii, or
through them.

Occasional..... { A. cervicalis superficialis. Around edge of splenii, or
through them.

Rare..... { A. cervicalis ascendens. Branch through above fifth ver-
tebra takes the place of A. cervicalis profunda.

M. semispinalis cervicis, and longissimus cervicis:

Constant..... { A. cervicalis profunda. Small branches.
A. intercostalis suprema (R. dorsalis).

Frequent..... R. ascendens transversa colli. Small branches.

Occasional..... { R. descendens transversa colli. Small branches.
A. cervicalis superficialis. Small branches.
A. cervicalis ascendens. Small branches.

M. spinalis cervicis, and iliocostalis cervicis:

Constant..... A. intercostalis suprema (R. dorsalis).

Occasional..... { R. descendens transversa colli. Small branches.
A. cervicalis superficialis. Small branches.
A. cervicalis ascendens. Small branches.

M. multifidus spinæ, interspinæ, and intertransversæ:

Constant..... { A. vertebralis.
A. cervicalis profunda.

M. diaphragma:

A. mammaria interna.

M. rectus abdominis:

A. mammaria interna.

Shoulder joint:

Constant.....	{	A. transversa scapulæ.
		A. circumflexa scapulæ.
Frequent.....	{	A. transversa colli.
		A. cervicalis superficialis.

Clavicula:

A. transversa scapulæ.

Processus acromialis:

A. transversa scapulæ.

A. cervicalis superficialis, or transversa colli.

Sternum:

A. mammaria interna.

A. transversa scapulæ.

Glandula thyroidea:

A. thyroidea inferior.

Glandula mammaria:

A. mammaria interna.