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ANOMALIES OF DEVELOPMENT IN THE ARTERIAL SYSTEM ENCOUNTERED IN MATERIAL COMPRISING 150 CADAVERS

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The problems attaching to anomalies of development in arteries are of significance from the point of view of both the pathologist and the clinician. They have been studied by anatomists profoundly and comprehensively for a long time, but the recent rapid progress of cardiac surgery has, for obvious reasons, caused all attention to centre in the anomalies occurring in the large arterial trunks in the mediastinum. At the same time, clinical practice combined with experimental research work has given rise to a number of problems, for which therapeutical solutions are now well within reach by means of surgical interventions performed on arterial trunks, such as ligature of vessels, the extirpation of individual vascular areas, the production of anastomoses, etc.

It is hoped that a description of the abnormal cases encountered by the present authors while working up 150 cadavers preserved in formalin, for the greater part derived from the Mental Homes in Tirnaveni and Riul Vadului near Sibiu, will merit interest on the part of research workers and vascular surgeons.

In the following, these cases will be discussed in groups arranged according to the vascular areas in which the anomalies occurred.

A) Anomalies of development in the arch of the aorta

There were 7 of these anomalies, representing 4,66 per cent of the material studied.

In 2 of them, the two common carotids and the right subclavian artery arose from a common trunk that sprang from the arch of the aorta, while the left subclavian arose at a distance of 1,5 cm directly from the arch. The common trunk was 3 cm in length (Fig. 1).

In 3 cadavers, the left common carotid took its origin so very close to the truncus brachiocephalicus that the two arterial trunks appeared to be a single common one. The left subclavian artery, like in the first-mentioned 2 cases, sprang directly from the arch of the aorta, at 1 cm lateral to the left common

carotid. Both arteries were given off from the anterior surface of the arch of the aorta, and not, as is usual, from its convex surface (Fig. 2).

In one case, instead of the usual three, four branches arose from the convexity of the arch of the aorta. Three of them were normal in origin and division, while the fourth, which corresponded to the left vertebral artery, sprang immediately next to the left subclavian from the posterior surface of the arch, passed straight upwards, and, entering the costotransverse foramen of the 6th cervical vertebra, proceeded towards the base of the skull (Fig. 3). In cases similar to this, the vertebral artery offers no help in locating the stellate ganglion, to which it runs medially; owing to the changed topographical conditions, a better guide to that nerve centre is the inferior thyroid artery crossing the sympathetic trunk in front.

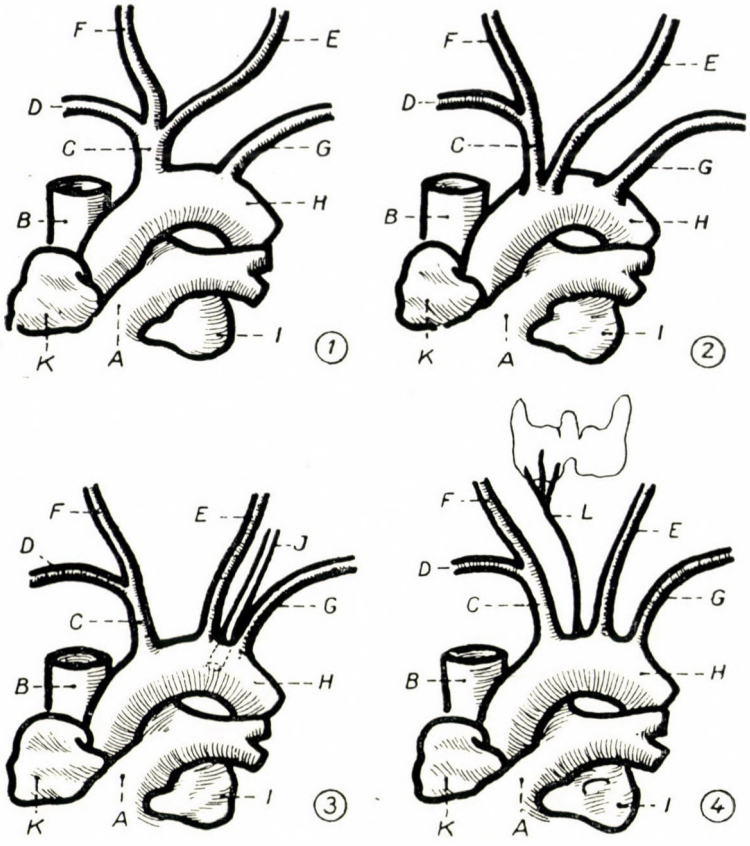
In the last case in this group, an artery 3 mm in diameter was found to arise from the convexity of the arch of the aorta, between the brachiocephalic trunk and the left common carotid, and to pass in front of the trachea towards the right lower pole of the thyroid gland. The right inferior thyroid artery was missing and the right lobe of the thyroid gland was more developed than the left (Fig. 4). This anomalous artery, which according to some authors occurs in 7 per cent of cadavers, has been first described by NEUBAUER under the name a. thyreoidea anomala. In our material, a similar but somewhat thinner artery was encountered in six cases, in two of which the inferior thyroid artery of the corresponding side was absent, while in four it was present but undeveloped.

B) Anomalies of development in the external and internal carotid arteries

a) Of the two basic types of *bifurcation of the common carotid*, in our material division at a high point was the one represented in a greater proportion; these cases were accompanied by changes in the origin of the individual branches of the external carotid artery.

In three cases, two superior thyroid arteries were found on each side, of which the upper ones hooked around the thyroid gland and passed on to the laryngeal cavity. These arteries, which normally arise from the superior thyroid artery as a. laryngica cran., pierced in one instance the hyothyroid membrane, and in two instances the lateral laminae of the thyroid cartilage.

b) Of the branches of the *external carotid artery*, the lingual artery was in 13 cases (8,66 per cent) found to arise from a common trunk with the facial artery. After covering a short path of about 0,5 cm, this trunk divided into two branches forming an acute angle between them. One branch penetrated the submaxillary triangle and continued its course as the facial artery, the other curved to behind the hyoglossus muscle at the height of the greater cornu of the hyoid bone (Fig. 5).



Figs. 1—4

A : A. pulmonalis
I : Auricula sin.
H : Arcus aortae
G : A. subclavia sin.
F : A. carotis comm. dext.
K : Auricula dextra
B : V. cava sup.
C : Truncus brachiocephalicus
D : A. subclavia dext.
E : A. carotis comm. sin.
L : A. thyreoidea anomale

In two of these 13 cases (or 1,33 per cent of our material) the lingual artery forced its way to among the muscles situated above the hyoid bone by piercing through the hyoglossus. This type of variation is bound to cause some confusion when we look for the lingual artery within Béclard's triangle, where under normal circumstances it is overlapped by the hyoglossus muscle.

In our material, origin of the lingual and facial arteries from a common trunk usually went hand in hand with the topographical variation related to Béclard's triangle.

Anomalies of development of the facial artery are of little practical significance ; nevertheless, it is interesting to note that in about one fifth of our

cadavers two fairly developed branches were given off by this artery at the height of the corresponding angle of the mouth, and that its continuation towards the medial palpebral commissure was conspicuously rudimentary. The smaller of the two terminal branches of the external carotid, the superficial temporal artery, in most cases divides not at the height of the neck of the mandible, but cranial or caudal to it. In almost one third of our cadavers, it reached the temporal region already divided into branches, whereas usually it is only there that it divides.

In two instances, the zygomaticoorbital artery passing towards the lateral palpebral commissure was found to arise from the ventral branch of the temporal superficial artery, whereas it is normally given off from the common trunk of the latter.

The tortuous course followed by the frontal branch of the artery, and regarded by many authors as characteristic of old age, was not infrequently encountered in our material in cadavers of young subjects.

No anomalies of practical significance were observed in the origin and distribution of the maxillary arteries.

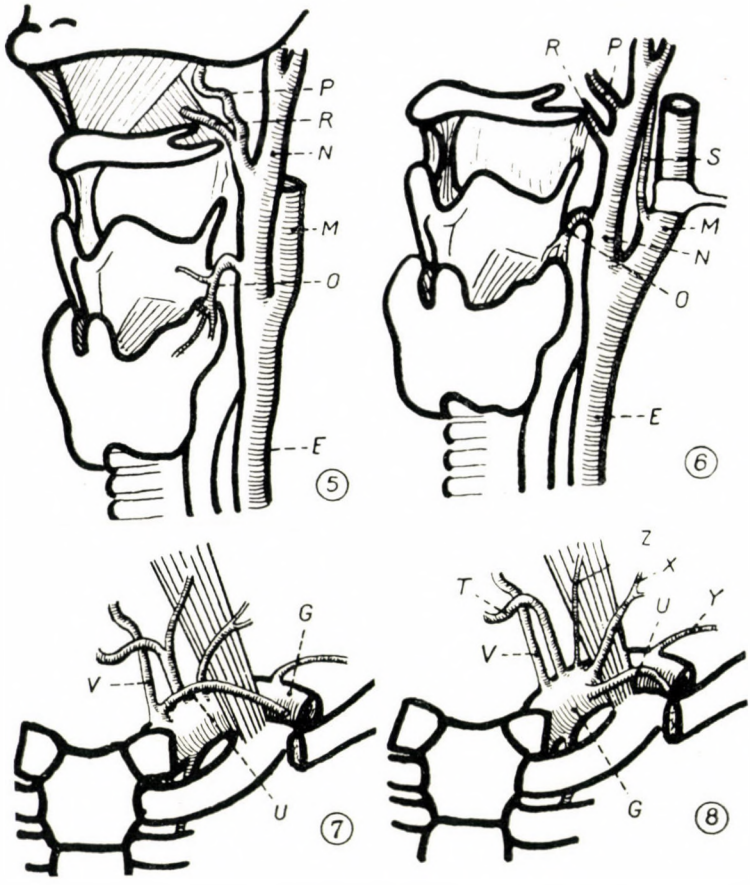
From the distribution of, and the course run by, the facial arteries one gains the impression that sometimes the two arterial networks which supply the face keep each other in balance. It was frequently noted in our material that where the terminal branch of the facial artery, the angular artery, was rudimentary, there the branches of the superficial temporal artery were more than usually developed and tortuous.

c) For its length the *internal carotid artery* depends upon the point of division. In its course it often presents a number of curvatures, and in one of our cadavers it meandered so remarkably that the deepest curvature approached the palatine tonsil to a distance of but 3 mm. At throat operations the significance of similar cases must be obvious.

One of the most frequently encountered variations in this group is the transposition of some of the branches of the external to the internal carotid artery. In one of our cases, 3 cm above the bifurcation of the common carotid, a thin artery took its origin from the medial surface of the internal carotid, ran parallel with it, and then passed along the lateral pharyngeal wall towards the base of the skull. This artery of irregular course substituted the ascending pharyngeal artery (Fig. 6).

C) Anomalies of development in the subclavian artery

The most often encountered arterial anomalies are the variations occurring in the subclavian artery. Since the subclavian and its continuation, the axillary, pass through the most intricate regions of the body, any variations in these



Figs. 5—8

E : A. carotis comm. sin.
G : A. subclavia sin.
N : A. carotis ext.
P : A. facialis
S : A. pharyngea ascendens
V : A. vertebralis
X : A. cervicalis superfic.
M : A. carotis int.
O : A. thyreoidea sup.
R : A. lingualis
T : A. thyreoidea inf.
U : A. transversa scapulae
Z : A. cervicalis ascendens
Y : Truncus costocervicalis

arterial portions are apt to aggravate the difficulties of surgical exploration. Anomalies of development of the subclavian artery being so very frequent, it is but seldom that the type descriptions in textbooks on anatomy fully correspond to actual findings at autopsy.

Very great is the number of cases in which the branches of the subclavian artery arise in a group from a common trunk. In one of our cadavers the vertebral artery took its origin from the same trunk as the transverse scapular artery, the peripheral portion of the latter showing distribution true to type (Fig. 7).

In another case the continuation of the intracranial vertebral artery, the basilar artery, was seen to bifurcate after covering a short path on the basal part of the pons, and to unite again to pass as a common trunk towards the rostral margin of the pons.

There appears to be close correlation between anomalous development of the arterial circle of Willis and the variations occurring in the internal carotid and vertebral arteries. The usual case is that the right and left parts of the arterial circle are not quite symmetrical, but occasionally the part of the arterial arch given off from the internal carotid is more fully developed than that which takes its origin from the vertebral artery; or it may be just the other way round.

In two of our cadavers, the posterior cerebral artery arising from the vertebral artery was found to be unusually underdeveloped in the portion before its uniting with the posterior communicating artery. The portion after the union was double the previous diameter. The assumption seems justified that its developed condition was due to the effect of a higher blood pressure which asserted itself from the direction of the internal carotid *via* the posterior communicating artery.

The anterior communicating artery was absent in six of the cadavers. The posterior was present in all of them; its absence is an exceedingly rare occurrence.

Variations of development are more common in the branches given off from the first portion of the subclavian artery than in the others. The thyrocervical trunk was present in the absolute majority (81 per cent) of our cases. In 19 per cent of them, its branches arose from the subclavian, either each independently (Fig. 8), or by a partly common trunk. In two instances, the thyrocervical trunk was made up of the inferior thyroid, the ascending cervical, and the suprascapular arteries, while its last branch, the superficial cervical artery, took its origin from the subclavian, lateral to the said trunk. In another two cases, in addition to these branches, the deep cervical branch too arose from the thyrocervical trunk, though normally it is given off by the costocervical. In such instances it seems justified to refer to the common trunk as the truncus thyreo-tricervico-scapularis (Fig. 9).

Above, when discussing the anomalies of development occurring in the arch of the aorta, mention has been made of the occasional absence, or but rudimentary presence, of the inferior thyroid artery, as also of its frequent substitution by Neubauer's a. thyreoidea anomala. This artery, passing in the mid-line in front of the trachea, calls for increased caution in performing tracheotomies.

In view of their slight practical significance, the anomalies of development occurring in the lesser branches of the subclavian artery need not be discussed here.

D) Variations in the more important arterial trunks of the upper extremity

a) *Anomalies of development of the axillary artery*

In exposing the axillary artery, account must be taken of an anomaly in muscular development, by which the topographical conditions of the axilla, fairly complex in themselves, may become even more intricate. This rather rare abnormality of muscle development is the arcus axillaris described by LANGER. Its practical significance lies in that it covers the more readily accessible portion of the axillary artery, and is easy to confuse with the coracobrachialis muscle that serves as a guide in exploring the artery. To avoid such confusion, the course taken by the muscular fibres, perpendicularly crossing the fibres of the coracobrachialis, should be followed.

The developmental anomaly described more than once by MALGAIGNE and FARABEUF were observed in our material in a single cadaver.

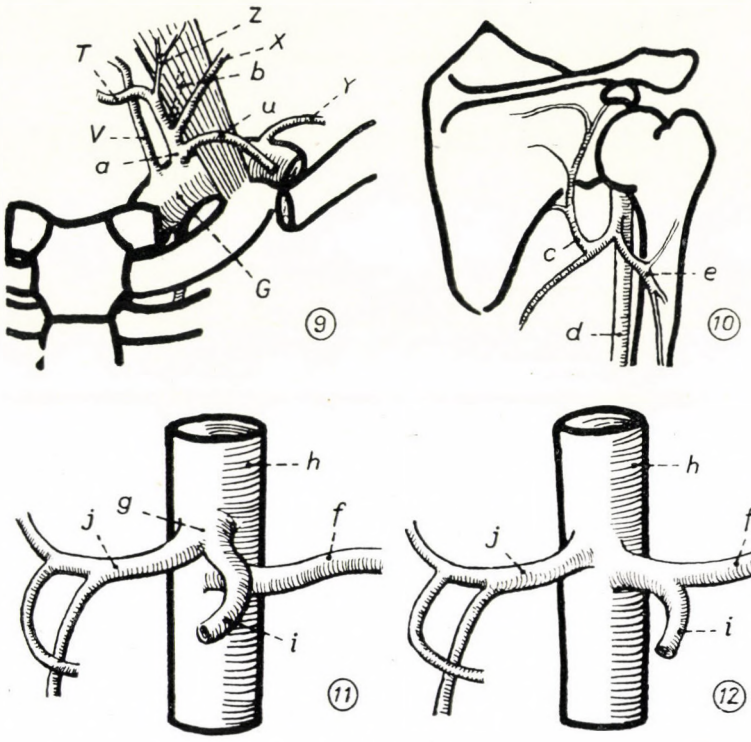
Concerning the not uncommon abnormalities of the axillary artery, our two cases deserve to be mentioned, in which the subscapular and the superior profunda arteries were of common origin (Fig. 10). From the third portion of the axillary artery, near the axillary border of the scapula, there arose a trunk 2 cm in length and 0,5 cm in diameter. One of the branches given off by it, the subscapular artery, passed perpendicularly upwards and bifurcated in the usual manner at the level of the medial axillary groove. The other, the superior profunda artery, deflected axially in front of the long head of the triceps brachii, and passing distalward, fitted into the sulcus nervi radialis. In this case the volar and dorsal humeral circumflex arteries took their origin from the superior profunda artery. In another cadaver the dorsal humeral circumflex and the subscapular arteries arose from a common short trunk. The latter artery was more than usually developed.

Being of no or but little influence on the collateral circulation of the upper extremity, only slight practical significance seems to attach to the developmental anomalies of the axillary artery. In our experiments carried out with coloured substances the collateral network invariably proved adequate for the distal part of the axillary artery to fill up from it.

b) *Anomalies of development of the brachial artery*

In the majority of cases, developmental variations of the brachial artery present themselves on one side only, while the arteries of the upper extremity on the other side are of normal origin and distribution.

In 12 out of our 150 cases (8 per cent), the brachial artery divided into its two terminal branches high up the arm ; the point of division mostly fell



Figs. 9—12

G : A. subclavia sin.
V : A. vertebralis
T : A. thyreoidea inf.
Z : A. cervicalis ascendens
U : A. transversa scapulae
X : A. cervicalis superfic.
Y : Truncus costocervicalis
a : Truncus thyreo-tricervico-scapularis
b : A. cervicalis profunda
c : A. subscapularis
d : A. brachialis
e : A. profunda brachii
f : A. lienalis
g : Truncus coeliacus
h : Aorta abdominalis
i : A. gastrica sin.
j : A. hepatica comm.

into the upper, less frequently into the middle, third. In 9 out of these 12 cases, the radial artery commencing at the high bifurcation of the brachial, followed a normal course. The ulnar artery passed side by side with the radial to the bend of the elbow, where the common interosseal artery running along the axis of the forearm was given off from it (GIACOMINI's truncus ulno-interosseus).

In one of our cases, the common interosseal artery took its origin at the level of the bend of the elbow from the radial artery which divided in the upper third of the arm and followed a normal course (truncus radio-interosseus). In this case the ulnar artery, lying beneath the fascia, pierced through the fascia brachialis and proceeded distalward to the wrist in the subcutaneous connective tissue.

A characteristic common to all these cases was that while the trunk giving off the common interosseal artery invariably displayed normal conditions, the other branch, which usually ran in the superficial layers above or beneath the fascia, did not.

From a practical point of view greater interest seems to attach to our following case. Above the epicondylus ulnaris humeri, about 6 cm proximal to it, a pyramidal cartilaginous protuberance (processus supracondylicus) was found, from which a fibrous band 4 mm in width passed to the epicondylus ulnaris humeri. The origin of the humeral head of the pronator teres muscle was seen to be transpositioned to this cartilaginous process and the band originating from it. The portion of the ulnar artery beyond the bend of the elbow, passed beneath this muscle of anomalous origin.

Apart from confirming that it is usual for several different abnormalities to appear simultaneously, this case is not without interest to the clinician either ; first, because the palpable supracondylary process gives information as to the expectable muscular and arterial anomalies of development ; secondly, because the muscle covering the ulnar makes it a difficult task to expose that artery.

Anomalies of development are of no great frequency in the volar arches, nor are they of particular practical significance. Mostly, the superficial volar branch is wanting, in which case the ulnar artery alone comes to form the superficial volar arch. In our material this abnormity was seen in 20 cadavers (13,33 per cent).

Not a single deep volar arch of abnormal development was encountered.

E) **Anomalies of development of the thoracic aorta**

Anomalies of the intercostal arteries arising from the thoracic aorta are not uncommon, but of no special practical consequence.

In two of our cases, the first four right intercostal spaces were supplied by the supreme intercostal artery arising from the costocervical trunk, while in one case the same trunk divided in the first three right intercostal spaces.

A few instances were encountered in which, after running a short path in one of the intercostal spaces, an intercostal artery diagonally crossed the corresponding intercostal space and continued in the adjoining one.

F) **Developmental anomalies of the abdominal aorta**

In our material, the abdominal phrenic artery arising below the diaphragm took its origin in two cases from the coeliac artery, and in one from the abdominal artery at a point below the coeliac trunk.

From among the abdominal unpaired visceral branches, abnormities are common in the coeliac artery. The variation most frequently seen is that its branches are given off separately from the abdominal aorta instead of by a common trunk.

In two cases, the splenic artery arose independently from the abdominal aorta, 1 cm below the coeliac trunk. The other two branches of that trunk sprang by a common trunk from the aorta above the splenic artery (Fig. 11). In further three cases, the left gastric arose in common with the splenic artery, while the common hepatic artery took its origin in two of these same cases from the abdominal aorta, and in one from the superior mesenteric artery (Fig. 12).

In these as well as in several here not discussed cases the anomalies of the coeliac trunk were not infrequently associated with accessory hepatic arteries. They arose from one of the nearby (the left gastric or the superior mesenteric) arteries and entered the liver through the porta, or by piercing the visceral surface of the lobes, when they usually penetrated the left lobe as thin undeveloped branches.

Anomalies of development in the a. vesicae felleae, supplying the gall bladder, were relatively few in number in our material. In two cases, besides the a. vesicae felleae, arising from the right branch of the a. hepatica propria, a well-developed branch was given off to the gall bladder by the gastroduodenal artery. This fairly long branch, described by GOSSET and DESMARETS under the name of a. cystica longa, passed upward between the layers of the lesser omentum in front of the common bile duct towards the gall bladder, which it reached at the border between body and neck. In contrast with the a. vesicae felleae, which pursued a normal course and fell within Budde's triangle formed by the hepatic and cystic ducts and the liver, the a. cystica longa came to lie outside the triangle.

In the superior and inferior mesenteric arteries anomalies of development are not frequent, and of no great practical account. Some authors describe abnormal renal arteries to arise from them, to enter the kidney. In our material two such cases were actually seen.

The anomalies of the *renal arteries* are of considerable practical significance ; congenital floating kidneys, ureters following an unusual course, or lobar kidneys of the embryonic type, are commonly associated with them. Not infrequently, the surrounding vessels, too, display variations in origin and division, furnishing additional proof of the joint appearance of several arterial anomalies of development.

In our material 60 cadavers (40 per cent) showed major anomalies of the renal arteries, including cases where the two renal arteries arose from the aorta at different levels, as also the fairly numerous cases of the superior polar artery.

In 20 cadavers, an artery of medium thickness took its origin from the abdominal aorta below the renal arteries at a distance varying from case to

case ; this passed obliquely downward and lateralward and, near the lower pole, entered the kidney independently. The inferior polar artery of abnormal course crossed the ureter at the border of the renal pelvis. This anomaly occurred in 10 of our cases on the right side, and in 6 on both sides.

In 15 cases, the renal arteries were given off from the aorta by a stocky trunk 10 to 25 mm in diameter, whence they divided into 4 to 6 branches penetrating the kidney. What imparts significance to this anomaly is the a. retropyelica, which is encountered in almost every case, and by CHALIER and JALAFIER is stated to be present invariably. Before this artery reaches the renal pelvis, it crosses the extrarenal part of the hilus. Depending on its position, it may interfere with surgery performed on the renal pelvis.

In 4 of the afore-mentioned cases the spermatic was seen to have arisen from the renal artery.

G) Anomalies of development in the arteries of the pelvis

The angle of bifurcation of the common iliac artery comes to lie sometimes cranialwards, less frequently caudalwards ; in four instances it was at the height of the fourth lumbar vertebra, with the two arteries forming an angle of 60°.

The point of division of the common iliac arteries, too, is subject to considerable variation. In 60 per cent of our cadavers it was found medially and cranially to the sacroiliac articulation at the level of the fifth lumbar vertebra. In these cases the common iliac artery was more than usually short, not more than 2,5 to 3 cm in length. In 37 per cent of our material the internal and external arteries diverged at the height of the sacroiliac articulation of the corresponding side, while in 3 per cent the point of division was at the height of the fifth lumbar vertebra on the anterior surface of the psoas major muscle. In the latter cases the abdominal aorta bifurcated at the level of the fourth lumbar vertebra.

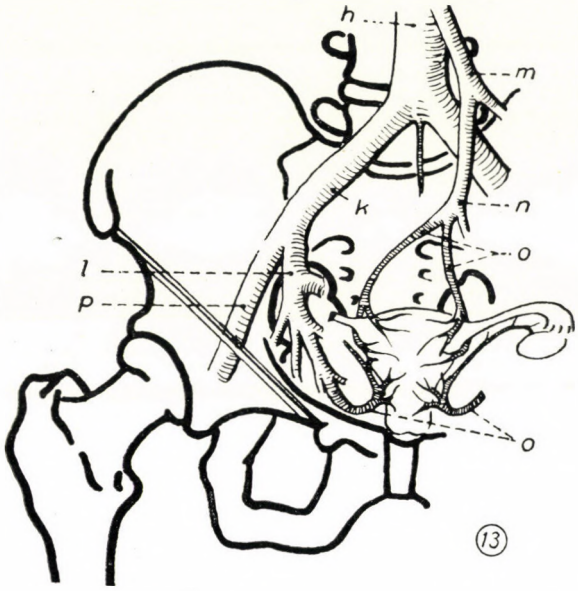
Anomalies of development are common in the *internal iliac artery*. Its length, which in our cadavers varied between 1 and 8 cm, was in inverse ratio to that of the common iliac artery.

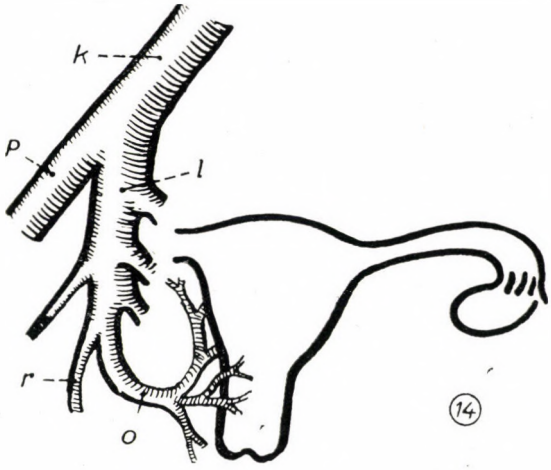
In one of our cases the lateral sacral artery arose from a short trunk in common with the medial rectal and the inferior vesical arteries, which normally take their origin independently.

In two cases the umbilical artery was unobstructed, and gave origin to the superior and inferior vesical arteries and the a. rectalis media.

Developmental anomalies of the uterine artery were rare in our material.

In one case two uterine arteries were encountered on each side, of which the upper ones sprang from the rectal artery, the lower ones from the internal iliac artery. The latter, running along the margin of the uterus, supplied branches to the cervix uteri and the lower portion of the body of the uterus, whence





Figs. 13—14

h : Aorta abdominalis
k : A. iliaca comm.
l : A. iliaca inf.
m : A. mesenterica inf.
n : A. rectalis
o : A. uterina
p : A. iliaca ext.
r : A. obturatoria

they curved lateralward between the bands of the broad ligament toward the ovary. The upper part of the uterine body was supplied by the uterine arteries that took their origin from the superior rectal artery (Fig. 13).

In another case the uterine artery arose in common with the obturator artery. After a 1.5 cm long common section the two arteries divided, forming an acute angle, each to continue thereafter its normal course (Fig. 14).

According to CLOQUET's statistics, anomalous origin of the obturator artery is a phenomenon less frequent in males than in females. In our material it was seen in 35 cases (23 per cent).

The obturator, which is a branch of the anterior iliac, and normally anastomoses through a thin branch, the pubic branch, with the inferior epigastric, was in these cases found transpositioned on to the last-named artery. A vessel, from 2,5 to 3,0 mm in diameter, arising from the interior epigastric, and curving downward and midward on a short course, passed into the obturator canal. Before its point of entry into the canal, it took up an underdeveloped a. obturatoria, only 1 mm in diameter, arising from the internal iliac, and running parallel to the pelvic brim ; apparently it was an obturator artery in rudimentary form.

The obturator artery of anomalous origin followed the lateral margin of Gimbernat's ligament and arched round the femoral vein, bounding medially the abdominal orifice of the femoral canal.

In view of its frequent occurrence, particularly on the right side of the body, and of its close connectedness with the abdominal orifice of the femoral canal, the significance of this anomaly in operations for femoral herniae, is obvious.

In conjunction with the anomalies of development in the pelvic arteries, the following case still deserves to be mentioned.

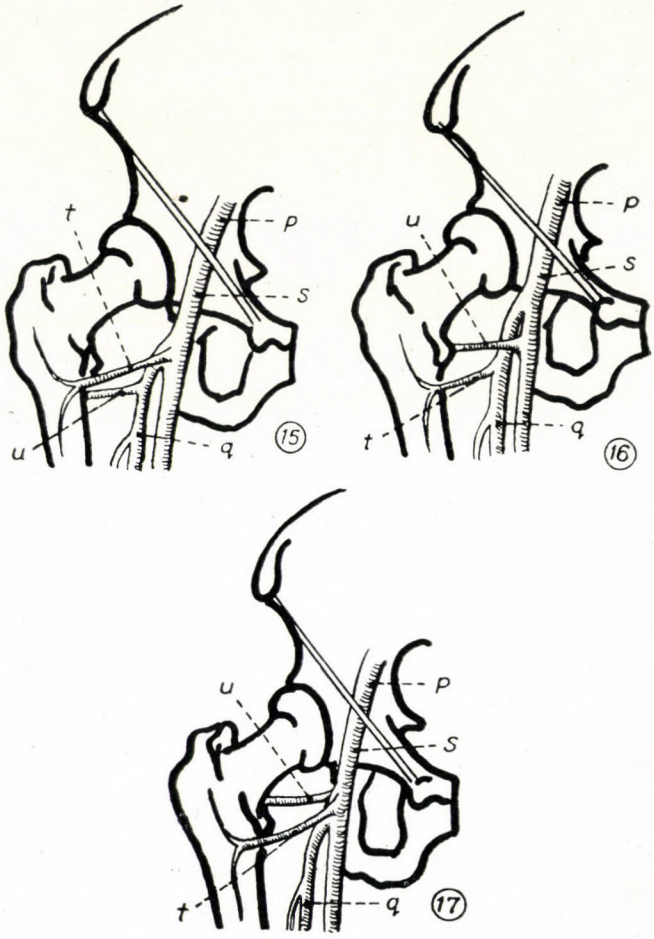
In the place of the arteria comitans nervi ischiadici, normally of 1 mm thickness, a meandering vessel of 5 mm diameter was encountered, which accompanied the sciatic nerve, and in the upper region of the popliteal fossa emptied into the popliteal artery. The obturator artery on the right side of the same cadaver was of anomalous origin.

H) **Anomalies of development in the arteries of the lower extremity**

a) Anomalies of development of the *femoral artery* are rare. Its absence or tripartite division is sometimes observed. Although statistics compiled by TESTUT, DUBREUIL, MARCELLINO and other authors, each comprise several hundred cases, only one or two such anomalies are mentioned in them.

In our material the deep femoral artery was mostly involved. In 35 per cent of the cases it arose from the femoral artery, from 2,5 to 3,5 cm below the inguinal ligament ; in one cadaver as much as 8,5 cm below it. In the rest of the cases the topographical situation of the point of bifurcation differed almost from case to case.

The tibial and fibular femoral circumflex arteries normally take their origin from the deep femoral artery. In our material 102 cases (67 per cent) were normal in this respect. In 26 cases the fibular femoral circumflex artery



Figs. 15—17

p : A. iliaca ext.
q : A. profunda femoris
s : A. femoralis
t : A. cirumflexa femoris fibularis
u : A. circumflexa femoris tibialis

arose from the femoral artery, immediately above the point of origin of the deep femoral. This type of variation was encountered in 5 cadavers on both sides, in 15 on the right, and in 6 on the left side. In 10 cases (6,6 per cent) the tibial femoral circumflex artery arose independently from the femoral : in 2 on both sides, in 6 on the right, and in 2 on the left, side (Fig. 16). In 4 cases the tibial as well as the fibular femoral circumflex arteries sprang directly from the femoral, above the point of division of the deep femoral artery ; this variation was in every case bilateral (Fig. 17).

b) The *popliteal artery* seldom shows variations in its course or point of division. Not a single case was met with in our material.

c) As concerns the *tibial arteries*, in one of our cadavers the anterior tibial, arising in the popliteal fossa, coursed around the head of the tibia, accompanied by the common fibular nerve, and passing beneath the fibular muscles, assumed a subfascial position on the boundary between the middle and upper thirds of the leg, to retain it for the rest of its course. This anomaly is rare ; VELPEAU and PELLETAN each reported a single case in their respective material.

In 3 cadavers an underdeveloped thin branch was found to take the place of the posterior tibial artery, and an unusually wide fibular artery to supply blood to the sole of the foot.

The plantar arteries are subject to frequent anomalies. In our material many variations were seen, manifesting themselves in the absence of one of the arteries, or their underdevelopment. They do not merit discussion in detail owing to their relative insignificance in surgery.

Summary

Anomalies of development in the arteries of 150 cadavers derived from mental homes have been described in groups arranged according to the vascular areas in which they occurred, and with particular reference to the morphological types significant from the point of view of vascular surgery.

REFERENCES

1. ADACHI : (1928) Das Arteriensystem der Japaner. — 2. ANDERSON : (1880) Abnormal arrangement of the thyroid arteries. J. Anat. Physiol. *14*, 353. — 3. ANSON : (1936) The anomalie of the subclavian artery and its importance. Surg. Gyn. Obst. *4*, 62. — 4. BARGE—LARRAND : (1938) Deux anomalies d'origine et de trajet de l'artère sousclaviculaire. Ann. d'Anat. Path. 842. — 5. BILLET : (1928) La circulation collatérale de l'artère humerale. J. Sci. Méd. Lille. 44. — 6. BRAINE FUNCK—BRENTANO : (1934) Les variations des artères du corps thyroide. Ann. d'Anat. Path. *2*, 125. — 7. BROWN—KELLY : (1925) Tortuosity of internal carotid in relation to pharynx. J. Laryng. Otol. *40*. 1. — 8. CAREL HENRI : (1935) Étude morphologiques sur l'origine, le trajet et le mode de ramescence de l'artère sousclaviculaire. Thèse. Bordeaux. 56. — 9. DALL'ACQUA : (1900) L'arteria temporale superficiale nell'uomo. Monit. Zool. Ital. *11*, 317. — 10 DUMITRESCU, D. : (1943) Sistemul aortic superior. Editura Cartea Romîneasca. Bucureşti. — 11. DOLGO—SABUROFF : (1933) Relations between positions of subclavious artery and scalenus muscle. Anat. Anz. *76*, 97. — 12. EUSTACHIOS : (1932) Anatomie des artères temporales. Ann. d'Anat. Pathol. *6*. 678. — 13. FISCHER : (1926) Disposition anormale des artères du membre superieur. Ann. d'Anat. Path. *5*. 509. — 14. FUNKE : (1897) Eine chirurgisch wichtige Anomalie der arteria lingualis. Arch. Klin. Chir. *54*, 323. — 15. GÉRARD—MARCHAND : (1928) Anomalies de l'artère radiale et de l'expansion aponévrotique du biceps. Ann. d'Anat. Path. 7. — 16. GILSON—HERMANN : (1913) Anomalies du tronc brachiocéphalique. J. Méd. Bruxelles. 12. — 17. GRUBER : (1872) Über die arteria thyreoidea ima. Virchow's Arch. *54*, 445. — 18. HACKENSELLNER : (1956) Über einige typische Varietäten, Anomalien und Missbildungen des Herzens und der herznahen Gefässe unter 1234 Obduktionen. Acta Morp. Hung. *6*, 403. — 19. HUARD—DOXMAN : (1934) Sousclaviculaire droite rétrooesophagienne. Ann. d'Anat. Path. *8*, 859. — 20. JATZOUTA : (1925) cit. Dumitrescu. — 21. JATSCHINSKY : (1889) Die Anomalien der arteria obturatoria und ihre Verhältnisse zum Schenkelringe und zu Brücken. Warschau. — 22. KATONA, I. : (1944) Adatok az arteria coeliaca-változatok keletkezésének időpontjához. Jankovich Emlékkönyv. 117—129. — 23. KRAUSE, W. : (1876) Varietäten der a. carotis interna und ihrer Äste. (In Henle's Anatomie III. p. 253.) — 24. KRAUSE, W. : (1876) Varietäten des Aortensystem (in Hdb. der Gefässlehre des Menschen v. J. Henle. 254).

— 25. LERICHE: (1920) La circulation sanguine dans le membre superieur après ligature de l'artère humérale. Lyon Chir. 250. — 26. MAAS, H.: (1882) Die Circulation der unteren Extremitäten. Dtsch. Ztschr. Chir. *17*, 197—207. — 27. NEGRÉ—MELCONIAN: (1927) Anomalie rare de l'arcade palmaire superficielle. Ann. d'Anat. Path. *3*, 309. — 28. NICOLAU: (1933) Perzistenta canalului arterial si aplazia arterei carotide si subclaviculare. Rev. Stint. Med. 561. — 29. OLIVIER: (1922) Topographie des nerfs du plexus brachial et des vaisseaux axillaires. Presse Méd. *102*, 1108. — 30. PELLEGRINI: (1904) Il tipo normale e le variazioni delle arterie subclavie ed axillaris. Monit. Zool. Ital. — 31. TESTUT: (1889) L'apophyse sus-épitrochléenne chez l'home. Vingt deux observations nouvelles. J. Internat. Anat. — 32. VUILLIÉME, J.: (1930) Anomalies de l'artère cubitale et du muscle cubital. Rev. Chir. 236. — 33. VUILLIÉME—BRUNCTON: (1932) Le tronc thyro-cervical arterial. Ann. d'Anat. Path. *6*, 689.

ИССЛЕДОВАНИЕ ПОРОКОВ РАЗВИТИЯ АРТЕРИЙ НА ОСНОВАНИИ НАБЛЮДЕНИЙ, СДЕЛАННЫХ ПРИ ВСКРЫТИИ 150 ТРУПОВ

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Авторы излагают пороки развития артерий на основании своих наблюдений, сделанных в ходе анатомического вскрытия 150 трупов. Исследования проводились на трупах, полученных из психиатрических лечебниц. Авторы излагают обнаруженные пороки развития артерий, распределяя их в группы по различным участкам артерий, выделяя более важные с точки зрения практики типы.

MISSBILDUNGEN UND VARIATIONEN DER ARTERIEN AUF GRUND VON AN 150 LEICHEN DURCHGEFÜHRTEN UNTERSUCHUNGEN

T. MAROS und E. LÁZÁR

Die bei 150 Sektionen gefundenen Missbildungen und Variationen des arteriellen Systems werden beschrieben. Das Leichenmaterial stammte aus Irrenanstalten. Die Befunde werden topografisch gruppiert und die in der Praxis wichtigen Fälle besonders hervorgehoben.

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