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THE MAJOR BLOOD VESSELS OF THE WING OF THE OSTRICH *(STRUTHIO CAMELUS)*

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ABSTRACT

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The major blood vessels of the ostrich wing were studied by dissection of the wings of 8 ostriches. The axillary artery entered the caudo-ventral aspect of the wing and divided into the brachial and deep brachial arteries. The deep brachial artery gave rise to the radial and ulnar collateral arteries which supplied the caudo-dorsal aspect of the brachium. The brachial artery divided in the cubital fossa into the smaller ulnar and large radial arteries. The ulnar artery supplied the cranio-ventral aspect of the antebrachium and manus, and the radial artery the caudo-ventral and dorsal aspects of the antebrachium and manus, including the feathers. With few exceptions the veins corresponded with the arteries that supplied the region they drained. The basilic vein passed along the cranial margin of the wing, unaccompanied by arteries or nerves, to drain the major part of the wing. The brachial artery and the basilic veins were the vessels most accessible for arterio- and venipuncture, respectively.

INTRODUCTION

Veterinarians are increasingly called upon to take blood samples or to give intravenous injections in ostriches. A search of the existing literature revealed a total absence of any description of the blood vessels in the ostrich wing.

The blood vessels of the thoracic limb have been described in a number of avian species. Baumel, King, Lucas, Breazile & Evans (1979) illustrate the blood vessels of the wing in the domestic pigeon, and Beaumont (1967) described the intra-osseus vasculature of the ulna in the domestic chicken. The arterial system of the domestic pigeon, including that of the wing, is described by Bhaduri, Biswas & Das (1957). An account of the vascular anatomy of the starling is given by Cralley (1965), while Gadhoke, Lindsay & Desmond (1975) make a comparative study of the vascular system of the cervico-thoracic region and thoracic limb of the domestic turkey. The arterial system of the herring gull is described by Gobeil (1970), and Nishida (1960) gives a description of the blood vessels of the thoracic limb in the domestic fowl.

The present study was undertaken to establish the blood-vascular pattern of the wing of the ostrich to determine blood vessels suitable for arterio- and venipuncture.

MATERIALS AND METHODS

The wings of 8 ostriches of both sexes between the ages of 2 weeks and 15 months were used in the study. The birds were anaesthetized by intravenous injection of 6 % pentobarbitone sodium, the left carotid artery was canulated at the base of the neck, and the birds were allowed to exsanguinate. After exsanguination they were fixed by perfusion at 100–120 mm Hg with 10 % formalin. After a minimum of 4 days the wings were removed and the arteries injected with red-coloured latex or a mixture of 2 parts latex and 1 part Micropaque[1], while the veins were injected with blue-coloured latex. Radiographs were taken of the vessels injected with the latex mixture, while the vessels, injected with coloured latex, were carefully dissected, photographed and then schematically drawn to illustrate their course and distribution.

[1] Nicholas Laboratories Ltd. Slough SL1 4AU, England

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GENERAL REMARK

In the standard anatomical position of the bird, the wings are outstretched laterally as in gliding flight. The surfaces of the wings, therefore, are dorsal and ventral rather than lateral and medial, as in the folded or resting position. In addition, the wing has cranial and caudal margins. In the descriptions to follow, the standard anatomical position was used.

RESULTS

Arteries

The blood supply to the wing of the ostrich came from the axillary artery (Fig. 1), which was the continuation of the subclavian artery distal to the origin of the common carotid artery. The axillary artery entered the caudoventral aspect of the wing and immediately divided into the brachial and deep brachial arteries.

The deep brachial artery (Fig. 1) passed dorso-caudally, where it gave rise to the following vessels:

(1) The collateral ulnar artery (Fig. 1), which passed laterally along the caudo-ventral border of the humerus in the groove between the humerotriceps and the insertion of the latissimus dorsi muscles. Approximately in the middle of the upper arm, the vessel turned dorsally, passing between the humerotriceps and scapulotriceps muscles, to reach the dorsal aspect of the wing. It supplied the surrounding muscles and skin on the dorsal aspect of the wing to the level of the elbow.

(2) The subscapular artery (Fig. 1), which passed caudally along the ventromedial border of the scapula, where it supplied the surrounding muscles.

A further 2 vessels were given off, one to the lateral aspect of the scapula (Fig. 1) and the other to the latissimus dorsi muscle (Fig. 1), before the deep brachial artery divided into the collateral radial and dorsal circumflex humeral arteries.

(3) The collateral radial artery (Fig. 1) followed a course parallel and caudally to the collateral ulnar artery, but passed dorsally to the latissimus dorsi muscle. It supplied the surrounding muscles and the skin on the dorsal aspect of the wing as far as the elbow.

(4) The dorsal circumflex humeral artery (Fig. 1) passed cranially between the deltoid and humerotriceps muscles, supplying both muscles and surrounding skin before it anastomosed with the ventral circumflex humeral artery.

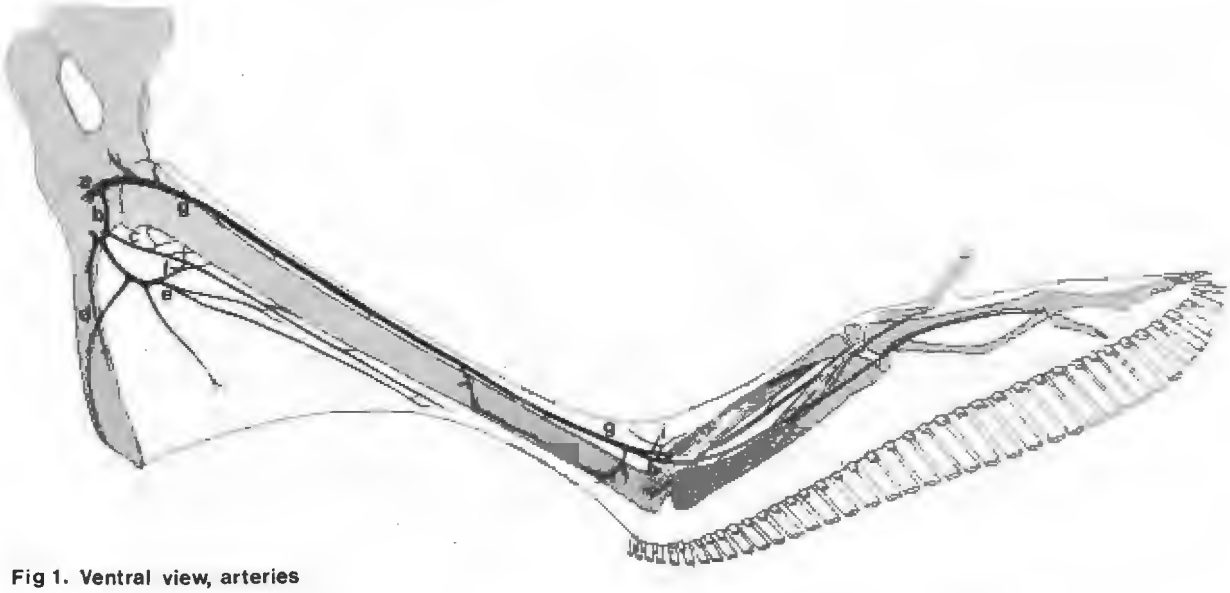

Fig 1. Ventral view, arteries

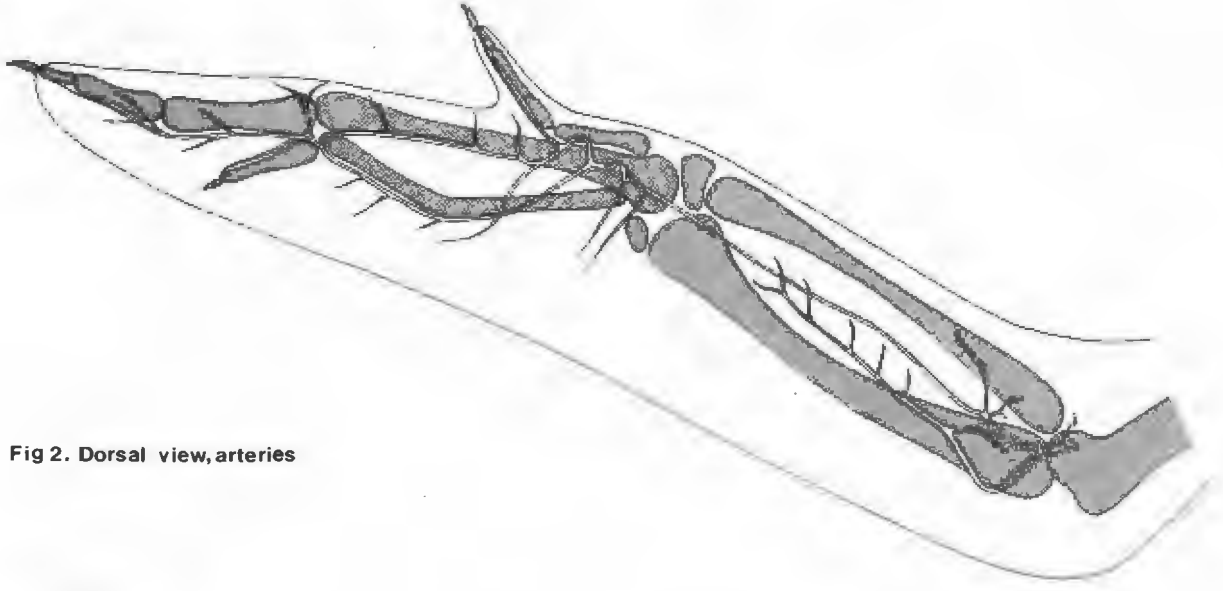

Fig 2. Dorsal view, arteries

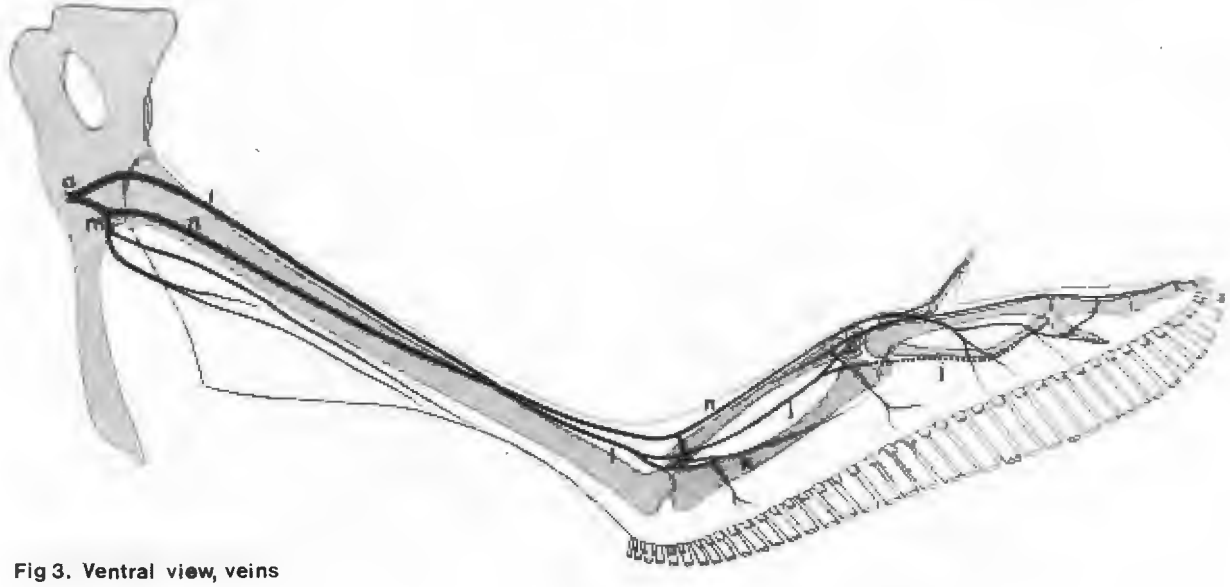

Fig 3. Ventral view, veins

The brachial artery (Fig. 1) passed craniolaterally over the shoulder joint and then laterally in the groove between the humerus and biceps brachii muscle to the elbow joint. Along its course it gave off branches to the extrathoracic diverticulum of the clavicular airsac, the skin over the shoulder and upper arm area, the surrounding muscle, and also the ventral circumflex humeral artery. The brachial artery terminated in the cubital fossa by dividing into the larger radial and smaller ulnar arteries.

The ulnar artery (Fig. 1) passed laterally on the ventral aspect of the antebrachium or fore-arm to supply the surrounding muscles and skin to the level of the metacarpophalangeal joint of the minor digit.

The radial artery (Fig. 1 & 2) passed dorsolaterally to supply the muscle, skin and feathers on the dorsal aspect of the antebrachium and manus, including the claw of the major digit.

Veins

With few exceptions, the veins of the ostrich wing corresponded with the arteries that supplied the region they drained. In the wrist and elbow regions, several veins form anastomotic connections not paralleling the arteries.

(a) The radial vein (Fig. 3) accompanied the radial artery and its branches, draining the caudo-dorsal aspect of the wing. It anastomed with the basilic vein at the wrist.

(b) The ulnar vein (Fig. 3) accompanied the ulnar artery and its branches, draining the caudo-ventral aspect of the wing. The ulnar vein anastomosed with the basilic vein at the elbow.

(c) The brachial vein (Fig. 3). The radial and ulnar veins joined in the cubital fossa to form the brachial vein. The brachial vein accompanied the brachial artery in the upper arm to drain into the axillary vein.

(d) The deep brachial vein (Fig. 3) was formed by the confluence of the collateral radial, collateral ulnar, subscapular and dorsal circumflex humeral veins. The veins accompanied their corresponding arteries. The brachial vein drained into the axillary vein.

(e) The basilic vein (Fig. 3) was the largest of the veins draining the wing. It began as the ventral digital vein of the major digit, draining its dorsal and ventral aspects. At the alula it was joined by the ventral alulal vein, received an anastomotic branch from the radial vein at the carpus, and then continued independent of any artery or nerve along the cranio-ventral margin of the antebrachium and distal brachium. In the middle of the upper-arm it crossed the ventral aspect of the humerus and continued proximally in the groove between the humerus and humerotriceps muscle to drain into the axillary vein.

DISCUSSION

The arterial supply and the venous drainage of the ostrich wing were established by careful dissections of latex-injected wings. The venous drainage paralleled the arterial supply, and both differed substantially from that of other birds studied. In the herring gull (Gobeil, 1970), domestic fowl (Nishida, 1960), domestic turkey (Gadhoke *et al.*, 1975) and the domestic pigeon (Baumel *et al.*, 1979; Bhaduri *et al.*, 1957), the deep brachial artery or its branches, the radial and ulnar collateral arteries anastomosed at or just distally to the elbow with the brachial artery or its branches, the radial and ulnar arteries. In the ostrich, no anastomoses between branches of the deep brachial and brachial arteries could be demonstrated. According to Baumel *et al.*, (1979), Bhaduri *et al.*, (1957), Cralley (1965), Gadhoke *et al.*, (1975), Gobeil (1970) and Nishida (1960), the main blood supply to the antebrachium and manus comes from the ulnar artery and its branches, the deep and superficial ulnar arteries. In the present study, the radial artery was found to form the main blood supply to the wing. The ulnar artery was poorly developed and represented only the superficial ulnar artery of other species. It supplied the ventral aspect of the manus as far distally as the metacarpophalangeal joint of the minor digit. Baumel *et al.*, (1979) states that the deep ulnar vein is the strongest antebrachial vein and the basilic vein the apparent continuation of the ulnar vein. In the present study there was no deep ulnar vein, and the basilic vein was formed by the ventral digital and metacarpal veins. The basilic vein also received anastomatic branches from the radial and ulnar veins. Because of its size and location, the basilic vein was the only vein in the wing of the ostrich suitable for venipuncture. All the other veins were either too deeply situated or too small for venipuncture. The best site for arteriopuncture was the brachial artery, where it passed over the ventral aspect of the head of the humerus. In this position there were no structures that could be damaged.

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LEGEND TO FIGURES

a. A. axillaris
b. A. brachialis profunda
c. A. collateralis ulnaris
d. A. subscapularis
e. A. collateralis radialis
f. A. circumflexa humeri dorsalis
g. A. brachialis
h. A. ulnaris
i. A. radialis
j. V. radialis
k. V. ulnaris
l. V. brachialis
m. V. brachialis profunda
n. V. basilica
o. V. axillaris