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Turkey Wing: Microsurgical Nuances

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Abstract

For the specialist neurosurgeon the daily practice of micro-surgical techniques are fundamental to the consolidation of the skills needed, in particular for the treatment of cerebrovascular disease. We have tested a simple and detailed micro-vascular training protocol, even feasible at home using turkey wings; this tissue proved optimal for micro-surgical practice and is easily preservable over a period of time. It also described a method for the preparation and preservation of the anatomical piece so as to allow a proper and lasting use, even for subsequent dissections.

Keywords: Turkey wing; Microanastomosis; Microsurgery; Vascular neurosurgery

Introduction

The treatment of cerebrovascular diseases according to the standard current therapies, requires that the specialist neurosurgeon needs even greater micro-surgical skills. The development and maintenance of this ability requires the surgeon to constantly practices in order to refine and consolidate the surgical technique. The opportunity to continuously attend to a microsurgery laboratory is not always a possibility for everyone, especially because clinical activity absorbs most of the resources in terms of time. With this premise we have been searching for a model that allows simple micro-surgical training, and that can be of assistance for daily practice in the domestic environment, but which has the characteristics of a standard micro-surgical laboratory [1,2]. With regards to the choice of the anatomic model that can be used for the micro-vascular training, it has been decided not to use live guinea pigs. The use of living animals in the context of scientific research in general today is rarer, for both the ethical position and for the commitment made in terms of economic resources to be allocated to personnel involved in the management of the animals [3]. Given the fact that with this work we want to describe a simple methodology, it was considered essential to identify anatomical parts that are readily available at a low cost. Various non-living models have been used including chicken and turkey wings that are particularly suitable for micro-vascular training [4-9]. In previous works chicken and turkey wings have already been used. In particular the latter has proved particularly effective for our micro-vascular training model. However, the lack of a simple and suitable methodology for domestic management of the specimens and micro-surgical training has inspired this work. The wing of a turkey has in fact the characteristics that make it particularly suitable for micro-vascular and microanastomosis dissection: first of all, the higher caliber of the brachial artery (about 1.3-1.5 mm) compared to chicken wings, makes microvascular practice much easier, and then the total length of the vessel itself allows a longer dissection and the possibility to perform a greater number of anastomosis for each specimen [4].

Object

The purpose of this study is to provide a detailed and schematic method for the use of turkey wings in micro-surgical dissection of neurovascular structures and in the execution of microanastomosis. It also describes a method for the preparation and preservation of the anatomical piece so as to allow a proper and lasting use, even for subsequent dissections.

Method

Ten turkey wings were subjected to micro-surgical dissection following a protocol articulated according to the following points:

1. Identification of the start point of the dissection of the brachial artery.
2. Identification of the end point of dissection. This point will be called "BIP" (brachial artery inflexion point) and
3. Corresponds to the bifurcation of the brachial artery in deep branch and superficial branch.
4. Cannulation of the vessel.
5. Irrigation of the vessel.
6. Injection of liquid silicone.
7. Long-term conservation of the specimen.
8. Reuse of the specimen in a months time for the complete dissection of the brachial artery.
9. Performing microanastomosis "end to side" after 1 month of preservation.

Materials used are:

1. Microscope AMSCOPE , 3.5X-90X zoom magnification power, 2-1/ 2" (65 mm) super wide field view and 8" (200 mm) large working distance, powerful 54-LED ring light with intensity control,
2. 640x480 pixel digital camera to capture microscopy images
3. 2 jeweler's forceps and a micro-scissors (MD Castroviejo)
4. 10/0 suture (Ethilon - Ethicon)
5. micro catheters 22 G (Delta Med)

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6. liquid silicone and red pigment for coloring
7. Ethanol 95%

Discussion

Once purchased, the turkey wing is frozen at - 18°C, until you need it. Before the dissection it is thawed slowly at + 4°C for at least 24-48 hours. At this point, we proceed with the identification of the proximal segment of the brachial artery, that is found on the surface of the ventral face of the wing at the level of the articulation of the humerus, between the triceps muscle placed cranially and the biceps muscle placed caudally (Figure 1). The dissection of the artery then proceeds distally to the inflection point of the brachial artery, called "BIP", where the artery is divided into two main branches, one deep and one superficial that runs over the surface of the flexor muscles (Figure 2). The next step is the cannulation of the vessel by means of a 22 G cannula, as the diameter of the vessel is on average about 1.3-1.5 mm. The vessel is now irrigated with water and chlorhexidine antiseptic detergent, until the outflow of liquid is observed from the ostium of the distal superficial branch of the brachial artery. Having completed this preparatory phase you can then proceed with the injection of liquid silicone previously prepared and stained (Figure 3). Notice the complete filling of the vascular axis (Figure 4) as well as the arterial portion not yet dissected (Figure 5). Having completed this process, the specimen is ready to be stored in a disposable surgical specimen container (Figure 6) in ethanol 95%. After eight days the anatomical piece can be used for further dissection with excellent tissue characteristics remaining. This method of conservation of tissue is particularly suitable even in a domestic environment, since the use of added chemicals or formaldehyde is not necessary. In our analysis the specimens were analyzed again 30 days later to check the state of preservation of the tissue; the results were very good in terms of integrity, colors, elasticity and softness. To complete the micro surgical training, we then proceeded to the dissection of the inflection point of the brachial artery, "BIP", with the isolation of the deep branch and the superficial branch, which has in turn been dissected up to the terminal ostium (Figure 7).

The superficial branch was then dissected free, sectioned and brought to the main arterial trunk of the brachial artery to perform a microanastomosis "end to side"7,8 with 8 stitches of suture 10/0, with the aim of testing the integrity of the tissue in relation to this specific micro-surgical technique (Figures 8 and 9).

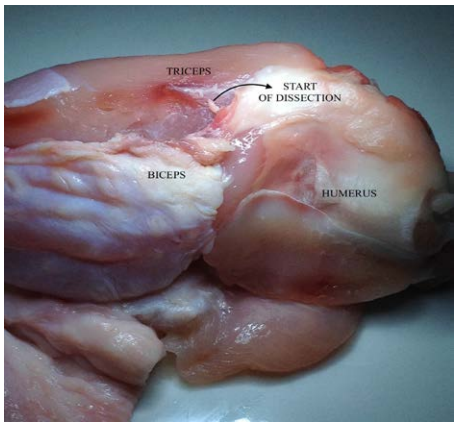

Figure 1: Identification of the proximal segment of the brachial artery, that is found on the surface of the ventral face of the wing between the triceps muscle and the biceps muscle..

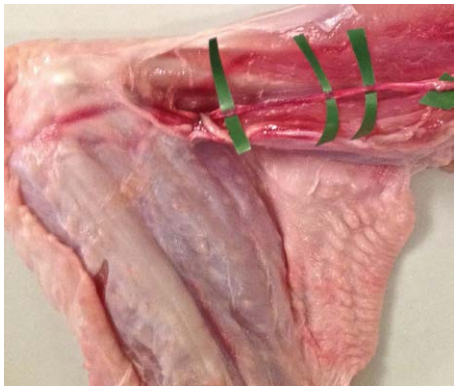

Figure 2: The brachial artery dissected until the inflection point of te vessel itself.

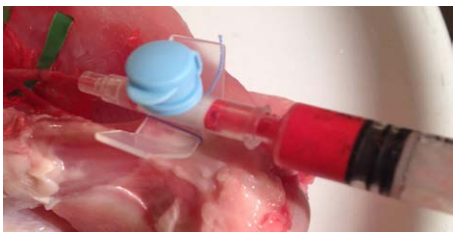

Figure 3: Cannulation of the brachial artery by means of a 22 G cannula.

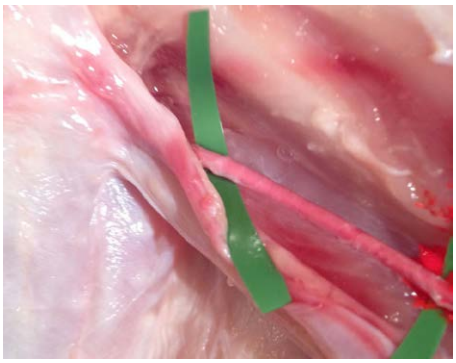

Figure 4: Complete filling of the vascular axis by liquid silicone.

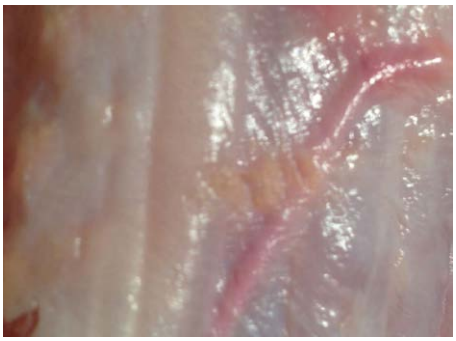

Figure 5: Complete filling of the superficial branch of the brachial artery not yet dissected.

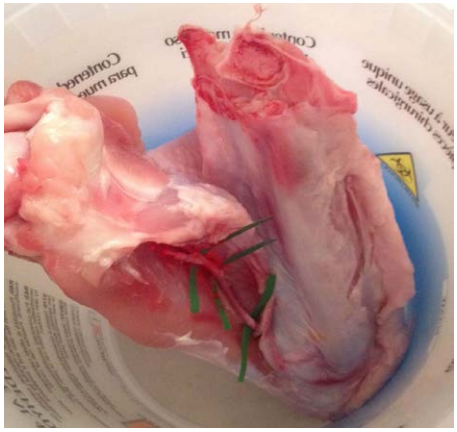

Figure 6: The specimen stored in a disposable container in ethanol 95%.

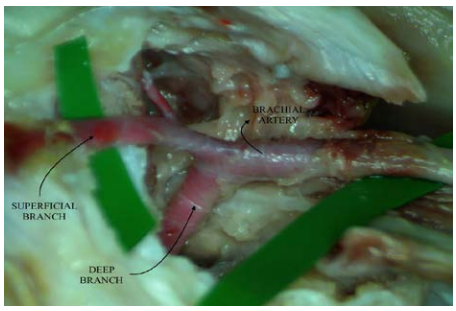

Figure 7: Brachial artery inflection point ("BIP") dissected free, with the isolation of the deep branch and the superficial branch.

Figure 8: "End to side" microanastomosis between the superficial branch and the main trunk of the brachial artery.

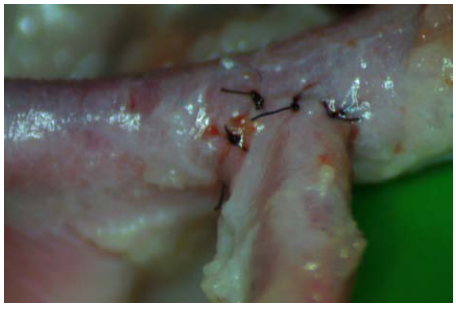

Figure 9: Close-up view of the anastomosis.

Conclusion

This simple protocol of micro-surgical dissection of the brachial artery of turkey wings, offers a guide to the surgeons who will use this type of specimen for the first time within the microsurgical dissection context. The method of long-term preservation also allows the extensive use of the specimen over a period of time with excellent preservation of tissue in all cases subjected to analysis. All specimens were still suitable for vascular microanastomosis even after 30 days.

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