Technical Note

A new bayonet spring microsurgical instrument handle with a bar for microneurosurgery

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Abstract

Background: The bayonet-shaped spring surgical instrument is essential and perhaps the most important tool in microneurosurgery. It is needed to be handled gently, and so stable handling to the spring tension of the long instrument handle is necessary for fine action in narrow and deep operative fields under an operating microscope.

Methods: A bayonet spring microsurgical instrument handle with a bar as a stabilizer is presented for facilitating delicate microsurgical manipulations stably in microneurosurgery. The bar with the handle is a metric projection. The grip of this instrument is a modified writing grasp, which is composed of writing grasp and sandwiching a lateral-projected bar with handle between the medial side of the index finger and the lateral side of the middle finger. Then, this bar as a stabilizer of the instrument is suitable to fix it.

Results: Microneurosurgical operations using this instrument system were performed. This was advantageous to stabilize the instrument in deep and narrow operative fields, to be sensitive to move its functional tips by fingertips, and to reduce unwanted movements under an operating microscope. This was disadvantageous to limit the rotational movement within fingers. There were no complications.

Conclusion: This handle would provide a steady and balanced grip to ensure precise manipulation of the functional tips of the bayonet instrument for microneurosurgery. It may be useful particularly for the beginners or for the non-dominant hand of microsurgeons.

Key Words: Bayonet instrument, microsurgery, spring instrument, surgical instrument

INTRODUCTION

The bayonet-shaped surgical instrument is essential and perhaps the most important tool in microneurosurgery. These can increase intraoperative visualization even within narrow and deep corridors because the bulk of the shaft of the instrument is outside the visual axis.
the long instrument handle is necessary for fine action in narrow and deep operative fields under an operating microscope. A stable microsurgical precision grip and straight spring forceps has been reported recently.[4]

In this technical note, a novel bayonet spring microsurgical instrument handle with a bar as a stabilizer is described for facilitating delicate microsurgical manipulations stably for microneurosurgery.

MATERIALS AND METHODS

Description of the instruments

A newly designed bayonet spring instrument handle with a lateral-projected bar has been produced as a variable stabilizer [Figure 1]. The bar with the handle is a metric projection (approximately 2-3 cm in length and 2-5 mm in diameter). The grip of this instrument is a modified writing grasp. It is composed of writing grasp and sandwiching a lateral-projected bar with handle between the medial side of the index finger and the lateral side of the middle finger. It is long enough to project over and rest the space between the index and middle finger. It is also slender but enough to stabilize the instrument. This bar as a stabilizer of the instrument is suitable to fix it between the index and middle fingers in writing grip. The bar can be suitably fixed at variable position on the handle by a screw or a detachable device in various situations [Figure 2]. When the bar is not needed, it can be taken off easily. An initial set of instruments (FUJITA Medical Instruments Co., Ltd., Tokyo, Japan) includes bayonet microsurgical instruments (microforceps, microneedle holder and microscissors) [Figure 3].

RESULTS

Twenty microneurosurgical operations using this instrument system were performed. This instrument was a simple and easy device. This was advantageous to stabilize the instrument in deep and narrow operative fields, to be sensitive to move its functional tips by fingertips, and to reduce unwanted movements under an operating microscope. This was disadvantageous to limit the rotational movement within fingers. It was useful particularly for the non-dominant hand. There were no complications.

DISCUSSION

In microneurosurgery, there are two types of microsurgical instrumentation: instruments with a single shaft and a functional tip (e.g., dissectors, hooks, curettes, knives, etc.) and instruments with a double shaft, a spring handle, and two functional tips (e.g., forceps, scissors, needle holders, etc.), so-called the “forceps family” of instruments or spring instruments.[5]
The spring instrument has been a uniform handle area with a spring loaded double-shaft since first surgical spring tweezers of ancient Greek and Roman. In spring microsurgical instrument, there are two basic types of the double-shaft handle: a posterior connected spring double-shaft handle (such as several models of jeweler’s forceps) and an anterior pivot-controlled and a posterior connected spring double-shaft handle (such as original models of Castroviejo’s needle holder or Barraquer’s scissors). These are usually held with the thumb, index, and middle fingers close to the working finest tips for control of fine and precise manipulations. These are made with a definite handle area with which to grasp the instrument and to fine-tune the opening and closing action of the fine functional tips against spring power. The bayonet instrument does not have balanced and coaxial shafts for handling such as the straight instrument. It is important that three fingertips must have stability as much as possible for the best performance of delicate manipulations using these instruments.

The surgeon is performed to place his fingertips in the correct position around the handle of a bayonet long instrument for microneurosurgery, which has been specifically designed to provide a steady and balance grip. Flat-typed or round-typed handles with various anti-skid surfaces have been developed. However, when microsurgical manipulation is done using the spring instrument by fingertips, surgeons must hold the instrument itself by same fingertips simultaneously. The role of this lateral-projected bar with handle enables it to be independent of grasping power by three fingertips and to reduce the surgeon’s attention in holding the instrument. When metacarpophalangeal joints are flexed in writing grip, the index finger converges to the ulnar side and adheres to the middle finger physiologically. It means that a posture of writing grip promotes the powerful closure between the index and middle fingers. This is advantageous to stabilize the instrument, to be sensitive to move these fingertips, and to reduce unwanted movements under the microscope. This is disadvantageous to limit the rotational movement within fingers. However, it would be less rotational in the bayonet spring instrument within fingers than in the straight instrument.

**CONCLUSION**

The present handle is a simple and easy device. The present method would provide a steady and balanced grip to ensure precise manipulation of the functional tips of the bayonet instrument for microneurosurgery. It may be useful particularly for beginners or for the non-dominant hand of microsurgeons.

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