History, Current Situation, and Future Development of Endoscopic Neurosurgery in China

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Key words
- China
- Current situation
- Endoscopic neurosurgery
- Future development
- History

Abbreviations and Acronyms
CNKI: Chinese National Knowledge Infrastructure

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OBJECTIVE: **During the past few decades, Chinese endoscopic neurosurgery has rapidly developed in synchrony with the rest of the world. The aim of this article is to review the development of Chinese endoscopic neurosurgery, including its birth, growth, current situation, and prospects.**

METHODS: **The history of Chinese endoscopic neurosurgery development can be divided into 3 stages: cognition and initial stage (1964—1995), exploration and maturity stage (1995—2006), and rapid development and promotion stage (2006—present).**

RESULTS: **In the first stage, we mainly began to become aware of endoscopic neurosurgery from the translation and review of literature. In the mid to late 1990s, Chinese neurosurgery pioneers began using neuroendoscopic techniques. In the following decade, many leading neurosurgeons made persistent efforts to push the development of Chinese endoscopic neurosurgery forward, focusing on advocating for and promoting and popularizing neuroendoscopic technology. In the rapid development and promotion stage, many representative national and regional neurosurgical centers became skilled and efficient in the application of neuroendoscopic technology and became new advocates of the technology. The number of cases, level of technology, and treatment effectiveness are gradually nearing international standards. However, future development requires promotion of balanced development to decrease regional disparities, further strengthen international exchanges, follow the latest developments, and constantly innovate for continuous improvement.**

CONCLUSIONS: **Following the dramatic efforts of several pioneers, development of Chinese endoscopic neurosurgery has been considerable, and it has become an important component of neurosurgery worldwide.**

INTRODUCTION

The clinical application of neuroendoscopy has been in existence for more than 100 years, since the use of the endoscope in the treatment of hydrocephalus by Lespinasse in 1910. However, the rapid development of modern endoscopic neurosurgery did not occur until the 1990s. In 1992, Jankowski et al.[1] first reported endoscopic transnasal resection of a pituitary tumor. In 1993, Perneczky published *Endoscopic Anatomy for Neurosurgery*.[2] In 1994, Bauer and Hellwig[3] proposed the concept of minimally invasive endoscopic neurosurgery. With this series of events, endoscopic neurosurgery entered into a new stage of rapid development. Neuroendoscopy technology has developed rapidly in the 21st century, and its applications continue to expand. Neuroendoscopy has become an integral part of minimally invasive neurosurgery.

The development of endoscopic technology in China has been a tortuous process. Document retrieval shows that the earliest article linked with endoscopic neurosurgery appeared in 1964. The founder of Chinese endoscopic neurosurgery, Wang Zhongcheng (Figure 1), mentioned that Dand and Scarff applied endoscopic choroid plexus cauterization to treat communicating hydrocephalus in the "new surgical treatment of hydrocephalus in infants: callosotomy, choroid plexus cauterization surgery."[4] However, it was not until 1996 that Wang Xiangchang (Figure 2) from China Peking University Hospital first reported the preliminary clinical application of the endoscope,[5] which marked the beginning of Chinese endoscopic neurosurgery. In 1998, the Neurosurgical Department of Beijing Tiantan Hospital established a professional neuroendoscopic group under the leadership of Zhang Yazhuo, which soon became the main driving force of the development of Chinese neuroendoscopy. Subsequently, with reform in China and the opening and growth of the Chinese economy, the era of Chinese endoscopic neurosurgery began to grow. Use of neuroendoscopic techniques increased rapidly, and the number of cases, the level of technology, and the treatment index gradually became closer to international standards.

HISTORICAL REVIEW

The development of endoscopic neurosurgery in China can be divided into 3 stages: cognition and initial stage, exploration and

Figure 1. The founder of Chinese neurosurgery, Wang Zhongcheng (December 20, 1925–September 30, 2012).

maturity stage, and rapid development and promotion stage. The first stage (1964–1995) is the cognition stage. In this stage, we mainly began to encounter endoscopic neurosurgery with the translation and review of foreign literature. In addition to the above-mentioned endoscopic technology reported Professor Wang Zhongcheng, Fu Guoshu published the first translated article of endoscopic neurosurgery in 1979.[6] Tu Tongjin, from the Fourth Military Medical University, published an abstract titled "Overview of Intracranial Endoscopy" in 1987 in the highest-level professional magazine in China, the *Chinese Journal of Neurosurgery*.[7] During the same period, the *Foreign Medical Journal* published several translated articles on endoscopic techniques,[8-10] and some reviews related to endoscopic technologies were published sporadically as well.[11,12] These articles introduced the application of endoscopic techniques in different neurosurgical areas, and it became gradually apparent that this technique could accomplish great outcomes in neurosurgeries. This enlightenment stage laid the foundation for later development.

Figure 2. Wang Xiangchang, Peking University Hospital.

The second stage (1995–2006) is exploration and maturity. In this stage, the development of Chinese endoscopic techniques was focused on several large neurosurgical centers, including Beijing Neurosurgical Institute/Beijing Tiantan Hospital, Guangdong General Hospital, Wuxi Second People's Hospital, and Shandong Qilu Hospital. However, most Chinese neurosurgeons still knew little about the importance of endoscopy. Pioneers of Chinese neuroendoscopic surgery included Zhang Yazhuo and Zhan Shengquan, who worked at driving forward the development of endoscopic application despite doubt from others. They expanded the application of neuroendoscopy from ventriculoscopic surgery and endoscopic-assisted biopsy to full-blown endoscopic skull base surgery, spinal endoscopic techniques, and transcranial endoscopic surgery, which finally encouraged rapid development of Chinese neuroendoscopy and neurosurgery methods.

Endoscopic technology in China debuted in 1995. Wang Xiangchang from Peking University Hospital and Liu Zonghui from Navy General Hospital carried out endoscopic techniques for the first time[5,13,14]; they mainly reported cases with ventriculoscopic surgery and endoscopic-assisted stereotactic biopsy. In the same year, Jiao Liqun and Zhou Maode of the First Affiliated Hospital of Shandong Medical University (Shandong Qilu Hospital) reported the application of endoscopic transnasal techniques in the resection of pituitary adenomas.[15,16] However, these reports are limited in the number of cases and diseases and are limited to the exploratory application of the technology.

In 1998, a professional neuroendoscopic group was established in Beijing Tiantan Hospital (the largest neurosurgical center in China). This group, under the leadership of Zhang Yazhuo, was committed to research and development as well as application and promotion of endoscopic technology. Since the beginning of the 21st century, the development of Chinese neuroendoscopy has continuously progressed. In 2000, Zhang Yazhuo was the first to report the comprehensive application of neuroendoscopic techniques in the bulk of neurosurgical cases (ventriculoscopic and skull base endoscopic surgeries).[16,17] In 2001, under the auspices and promotion of Zhang Yazhuo, the Department of Neurosurgery Branch of the Chinese Medical Association held the first symposium on neuroendoscopic technology in Beihai, Guangxi (**Figure 3**). In 2003, Professor Zhan Shengquan of Guangdong General Hospital published *Brain Endoscopy Technology*,[18] which was followed by publication of *The Technique of Endoscopic Surgery* by Zhang Yazhuo in 2004.[19]

Concurrent with the academic exchanges of endoscopic technology, the promotion of this technology also entered a new stage. In 2005, the Neuroendoscopic Expert Committee, which is part of the branch of Neurosurgery of the Chinese Medical Doctor Association, was established. The chairman of the first committee, Zhang Yazhuo, indicated that the main purpose of the Committee was to promote academic communication and cooperation and to advance the development of Chinese endoscopic neurosurgery. The Neuroendoscopic Expert Committee was established by gathering talented individuals from endoscopic neurosurgery and helped to promote the rapid development of Chinese endoscopic neurosurgery. Since 2006, the Committee has held annual academic sessions, and it has organized various academic seminars and workshops on endoscopic neurosurgery. In 2006, supported by the Neuroendoscopic Expert Committee and the Beijing Neurosurgical Institute, Zhang Yazhuo organized the First Beijing International Congress of Neuroendoscopy, which was held biannually. This international congress invited many well-known experts from the United States, Italy, Australia, Germany, and other countries to participate, and the attendees agreed