REVIEW

from

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about a dissertation on a topic

"Minimally invasive extended lateral orbital approach for intraorbital and intracranial pathology"

from

Dr. Lili Naskova Laleva

for

educational and scientific degree "Doctor of Philosophy "

in professional direction 7.1 Medicine, scientific specialty "Neurosurgery".

General information.

On the basis of order No. 15-03-392#1 from 18.11.2022, based on the regulations for the development of the academic staff at "Acibadem CityClinic UMBAL Tokuda" EAD, and a decision of the scientific council of "Acibadem CityClinic UMBAL Tokuda" EAD (Protocol No. 43/29.09.2022) I provide this review.

All the necessary materials are prepared by the candidate and submitted on time, fully complying with the requirements of the law and the regulations of the academic unit for the procedure for the academic position " Doctor of Philosophy ".

Brief biographical data

Lili Laleva was born in Sofia. She graduated First English Language High School in 2004. In 2010, she graduated as a Master of Medicine at the Medical University of Sofia. In 2016 she graduated with a master's degree in health management at Sofia Medical University. She acquired a specialty in neurosurgery in 2017. In 2018 she successfully passed the exam of the European Association of Neurosurgery.

During her studies and specialization, Dr. Laleva was awarded with several Bulgarian and international awards, she conducted clinical internships in renowned neurosurgery clinics in Italy, Germany, Denmark, Japan and training courses at EANS, AO spine, ISIN, ESMINT as well as at international centers, specialised in neuroendoscopy, skull base surgery and vascular neurosurgery. Dr. Lily Laleva is part of the author team of 26 scientific publications in Bulgarian and foreign medical journals, in a chapter of 1 textbook and in 56 reports at local and international scientific forums. She participated in 5 research projects.

Relevance of the problem

The development of neuroanatomical and clinical knowledge and that of modern neurosurgical technique leads to the study and application of more cosmetic and atraumatic surgical approaches. The possibilities of the transorbital surgical corridor to intracranial structures have been studied worldwide in the last decade and have been the subject of numerous anatomical and clinical papers.

The present work studies lateral orbitotomy, which is known and well-established orbital approach. Its application for the purposes of intracranial pathology with microscopic and endoscopic techniques are new to neurosurgical practice and remains to be studied.

Therefore, the topic of the dissertation work "Minimally invasive extended lateral orbital approach in intraorbital and intracranial pathology" is relevant and suitable for research.

Structure

The dissertation is presented on 158 pages and is illustrated with 32 figures (which include 8 author's original illustrations), 6 tables and 10 diagrams. The bibliographic reference includes 249 titles, of which 11 Bulgarian and 238 foreign authors and author groups. The scientific work is properly structured, according to the generally accepted requirements. It is written in understandable scientific language.

Introduction and literature review

The introduction and literature review presents briefly and clearly the main anatomical features and variations of anterolateral approaches in neurosurgery. The historical development, the basis and predisposition for the study of transorbital anterolateralapproach, as well as the current trends are analyzed.

On the basis of the literature review are formulated the current unsolved problems, related to the small number of anatomical and clinical studies on the subject, the lack of: defined anatomical landmarks, of clear criteria for the indications and contraindications for the application of the approach, of formed criteria for quantitative and qualitative assessment, of its advantages and disadvantages, as well as specific details of the technical implementation. These problems are the basis for building a correct working hypothesis and determining the purpose and tasks of the study.

Research methodology

The study consists of two main stages: a descriptive anatomical study and a prospective clinical study, with clearly defined goals and specific tasks.

The anatomical part of the study was conducted in the specialized dissection rooms of the Laboratory of Neurosurgical Anatomy (LSNA), from the Department of Anatomy and Embryology at the Medical University of Barcelona, Barcelona, Spain. It aims to define clear anatomical boundaries and landmarks of the lateral orbital approach adapted for intracranial surgery, to define the microscopic boundaries as well as the possible endoscopic corridors

The clinical trial is a nonrandomized, prospective, single-institution study. It was carried out in the neurosurgical department of Acibadem CityClinic UMBAL Tokuda" EAD, for the period December 2016-October 2020 on one hundred and sixty (160) patients, of whom surgical treatment by means of extended lateral orbital approach using microscopic and endoscopic-assisted technique was carried out on forty-two (42) patients. The remaining one hundred and sixteen (116) patients were the control group. Patients were divided into two main subgroups according to the pathology treated: a subgroup with vascular pathology of ruptured anterior circulation aneurysms and a subgroup with tumor pathology of meningiomas of the anterior and middle cranial fossa. In these groups were studied and analyzed the following parameters: adequacy of intraoperative exposure to achieve the goals of the operative intervention, duration of the operative intervention, intraoperative problems, postoperative clinical course and hospital stay, cosmetic result and postoperative complications. A statistical analysis of quantitative indicators was performed on the data for: craniotomy surface, duration of operative intervention and postoperative hospital stay. A point based scale for evaluating the cosmetic result has been adapted.

Regarding the study structure and conduction, it is comprehensive and covers all the necessary aspects needed for research of an operational approach.

Results

The goals, set by the author of the dissertation, were fulfilled and actually presented in the results.

In the anatomical part of the study are defined recommendations for ergonomics and instrumentation. The approach is described in two main steps: orbital and cranial. The bony limits and anatomical landmarks of the extended, adapted for intracranial pathology lateral orbitotomy are defined. The possible intracranial and intradural anatomical exposure with microscopic technique is described and four possible extradural endoscopic corridors (anteromedial, posteromedial, posterior and inferior) are defined. The results are clearly presented and well illustrated with photographic material from the performed dissections and explanatory author's original illustrations.

The clinical part of the study represents the included patients and their control groups, the epidemiological and clinical characteristics of the groups. Statistical test of homogeneity was performed. For qualitative indicators of minimal invasiveness, technical difficulty, the following were selected: the result of the operative intervention and the postoperative clinical course of the disease. Statistically analyzed quantitative indicators were: intraoperative time, craniotomy surface and postoperative hospital stay.

According to the results, presented by the author, the goal of surgical intervention can be achieved by extended lateral orbitotomy, both for vascular and tumor intracranial pathology. Additionally, are described cases, in which ases in which more complex techniques, such as extradural anterior clinoidectomy and management of intraoperative aneurysm rupture were performed with the approach. Details essential for preoperative preparation and technical implementation are described in detail. In the followed and examined postoperative course, compared with the control groups, it is shown that with this approach can be avoided complications associated with standard anterolateral accesses, such as postoperative epidural hematoma, postoperative epilepsy, facial nerve paresis, temporomandibular joint dysfunction, temporal sinking. The access-related periorbital soft tissue edema has been described and analyzed. Additional statistical analysis is also provided, demonstrating that this edema is independent of the use of autologous fat tamponade and spinal drainage. Photographic material demonstrates the postoperative course of the edema studied, as well as a quantitative evaluation of the cosmetic result.

Craniotomy size and postoperative hospital stay were selected as quantitative indicators of minimal invasiveness. A statistically significant difference between the size of the craniotomy surface with extended lateral orbital craniotomy and other anterolateral approaches and no such difference with other minimally invasive ones was shown. Intraoperative time was selected as a quantitative indicator of technical complexity and adequacy of the approach for which no statistical difference was found, except for the expected result of shorter intraoperative time in supraorbital frontolateral craniotomy. Additionally, the application of microscopic and endoscopic techniques is presented.

The author of the study presents the results methodologically and comprehensively, arranged according to the assigned tasks and the assigned methodology.

Discussion of the results

A thorough and comprehensive analysis of the results of the study conducted in this way and a comparison with the available literature is presented. Basic aspects such as: limitations of the approach, indications and contraindications for its use, comparison with other anterolateral approaches, analysis of applied microscopic, endoscopic technique, postoperative course and analysis of the approach related and pathology-related complications are discussed. The discussion is structured coherently and adequately addresses the basic anatomical and clinical aspects of the topic.

Conclusions and recommendations

After analyzing the results, the following 8 conclusions were formulated:

1. The extended lateral orbital approach is a minimally invasive and direct approach, that can be used as an alternative approach for neurosurgical pathology, routinely treated with pterional approach and its variations after selection of patients according to the established criteria.
2. The extended lateral orbitotomy adapted, for the purposes of intracranial pathology includes part of the frontal bone and the pterion area. This approach allows for four targeted endoscopic corridors.
3. The choice of this approach does not compromise the radicality of the tumor resection, the possibilities of clipping the aneurysm and allows technically more complex manipulations such as anterior clinoidectomy and management of intraoperative aneurysm rupture.
4. Compared with other conventional frontolateral neurosurgical approaches, the extended lateral orbitotomy is associated with less dissection of soft tissues and bony structures, with a smaller craniotomy area, resulting in a lower risk of complications such as epidural hemorrhage, dysfunction of the temporomandibular joint, temporal recess, postoperative epilepsy.
5. Compared to the most common minimally invasive anterolateral approaches, there is no statistically significant difference in operative time, postoperative complications and postoperative hospital stay.
6. The approach can be conducted with microscopic, endoscopic, and combined operative techniques. The endoscopic technique has indisputable advantages for atraumatic approach in depth in the conditions of anatomical dissection and is of key importance in accessing those areas of tumor pathology, that are outside the conic microscopic field. In clinical settings, when treating vascular pathology and a large part of tumor pathology, the microscopic technique combined with endoscopic examination gives good results.
7. In clinical settings, the approach is not associated with serious complications and is well tolerated by patients.
8. When a transpalpebral skin incision is used, followed by staged reconstruction and surgical union of the tissues, the approach has good cosmetic results.

These conclusions correspond to the set goals, have a primarily practical orientation and summarize the high scientific and contribution value of the dissertation. Contributions are divided into theoretical, methodological and practical.

Reference

The presented reference includes 249 titles, of which 11 from Bulgarian and 238 from foreign authors and author groups. It is sufficient in volume and structured according to the established criteria. The smaller number for Bulgarian authors corresponds to the firstly listed actual problem.

Related Publications

Presented are 7 original articles related to the topic,3 of which are in English in international medical journals and 4 are in Bulgarian in Bulgarian medical journals, as well as 5 abstracts of presentations at Bulgarian and international congresses. These publications fulfill the necessary criteria.

Conclusion

This dissertation represents an in-depth analysis of the anatomic and clinical features of minimally invasive extended lateral orbitotomy for intracranial and intraorbital pathology. The topic is relevant and well formulated. The goals of the study is clearly set and well

conducted, the results are systematically described and adequately analyzed. Based on the above, I can conclude Dr. Lili Laleva's PhD thesis on the topic: "Minimally invasive extended lateral orbital approach for intraorbital and intracranial pathology" has the necessary qualities and meets all the criteria for educational and scientific degree "Doctor"

16.12.2022
Varna

Respectfully
Prof. Dr. Yavor Petkov Enchev