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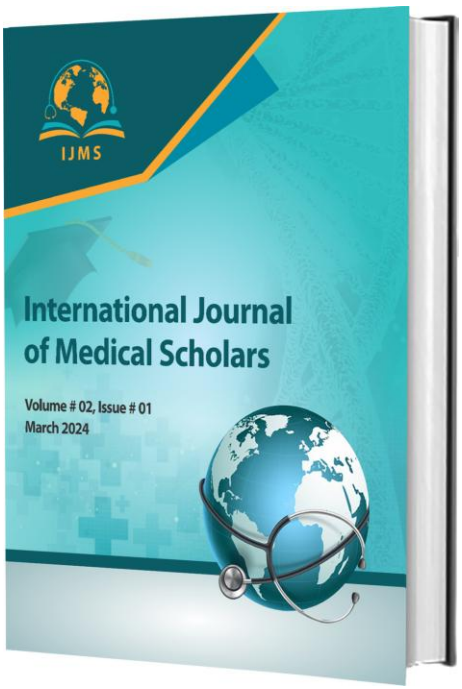

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Original Article

Neuroendoscopic biopsy of brain lesions; accuracy and complications

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ABSTRACT

Objective: *to assess the accuracy of neuroendoscopic biopsy of brain lesions and complications associated with it.*

Methods: *The neuroendoscopic procedures had been performed in 347 different patients in the last 10 years, i.e., from January 2010 to March 2020. The total of 40 patients was chosen from among those, that have tumors involving the ventricular or the periventricular region. There was a biopsy performed on these patients. Fatal complications were the only ones investigated. Bleeding was considered a major complication that called for the operation to be performed; the need for an unplanned EVD insertion; or it was also the reason of further surgery in some cases if the doctor found it postoperatively. The whole dataset was analyzed statistically using the computer software SPSS 23 version. Frequency and percentages were calculated for categorical variables, while mean and standard deviation were calculated for continuous variables.*

Results: *Out of the collected samples 33 (82. 5%) were successfully diagnosed and 12 of these were retested using another sample. Thirteen patients' cases were classified into the ongoing treatment phase while 8 of the patients' diagnosis were consistent with the follow-up phase. Out of these, 5 samples remained unlabelled because either the new biopsy findings sifted through and the clinical progression was at right angles to the diagnosis. Further, one patient responded that she or he could not make a decision about it. In the complete study out of 40 biopsies 38 samples were analysed but one of them died and one was lost from follow up.*

***Conclusion*:** *Our research findings indicate that employing the new technique for measuring the precision of endoscopic biopsy demonstrated great precision in diagnostic biopsy..*

Keywords: *Neuroendoscopic Biopsy, Brain, Lesions, Intraventricular, Periventricular, Hemorrhage, Endoscope*

1. INTRODUCTION

In 1973, this technique was first created by Fukushima by using a flexible fiberoptic ventriculofiberscope to perform an endoscopic brain biopsy [1]. Five years later, he reported that only 11 out of 21 patients who underwent such endoscopic biopsy were correctly diagnosed histopathologically among those with intraventricular tumors [2]. Nowadays, management of intra- and periventricular tumors involves endoscopy techniques [3, 4, 5]. It is commonly accepted by clinicians and preferred for tissue sampling purposes. Despite its high acceptance rate among medical professionals various diagnostic outcomes related to endoscopic procedures have been documented [6]. The success rates of endoscopic brain tumor biopsies as well as their accuracy with regard to diagnostic outcomes are outlined in literature review focusing on this subject.

Neuroendoscopic procedures have progressed due to the advances that have been made in the field of optics and lens. The use of neuroendoscopic biopsy for obtaining brain tissue sample has been described previously without few. On the other hand, although several studies have focused on the same in question, there is no explanation as to whether this method is accurate or not. However, most of the related researches do not have comparative researches using endoscopy in conjunction with another technique or a developed treatment but have individual cases of tumor only. Besides, several studies indicate differences in approach and hence a differentiation in the complication rate identified Stevenson, 2007; 2001; Rahman, 1994. In our investigation we wanted to determine its accuracy by comparing it with previous biopsy techniques and therefore investigate therapeutic advancements. To achieve this, we highlight neuroendoscopic biopsy complications documented in relation to similar literature findings.

2. METHODOLOGY

The Neurosurgery Department of Nishtar Hospital, Multan carried out approximately 347 neuroendoscopic interventions on different patients between January 2010 and March 2020. We picked out 40 patients with specific Libya extending the biopsies lesions from the database and obtained the rest with biopsy haematoma. The calculation of the sample size was made based on the Giannetti et al. reference study [9]. Non-probability (consecutive sampling) technique was utilized for the data collection. In this research, there were no age restrictions on patients. Additionally, patients were included in this study if they were found with a condition with the walls of the ventricle system either inside or outside the wall and also had plans for biopsy regardless they are successful or not. Excluded from this study were the patients, who had received such treatments as a colloid cysts resection, cyst aspiration, or cyst removal. Charts and histopathological reports were reviewed and after that patients were invited for follow-up visits, the respondents stated that they approved the provided information coming from our research projects. The Board of'Ihc Hospital's Ethical Committee provided Ethical Approval to conduct research within the hospital. They then reviewed the charts and histopathological and also invited patients for follow-up visits.

As a result of an obstruction of CSF flow, different techniques- based on site CSF flow obstruction - were utilized for biopsy along with diversion process on CSF. Tissues subsequently stained by H&E were embedded in the sample.

There was no available fix for such two kinds of tumors both benign and inoperable

as well as ependymitis- that had arisen because of cysticercosis. Accuracy of the biopsy specimen and diagnostic certainty were the metrics compared between histopathological outcomes and the specimens postoperatively, the drug response to the treatment plan, chemotherapy, radiotherapy as well as clinical and radiographic findings. A correct endoscopic biopsy was regarded as the case when a histopathological diagnosis and a sample obtained during craniotomy were congruent; if treatment corresponded to diagnosis, and if the diagnosis corresponded with the follow-up symptoms.

On the other hand, it was considered the cause of malignancy discrepancy every time a fresh biopsy from the craniotomy was done for new diagnosis or the changed rank of the tumor due to the modification of the treatment plan and the prognosis, and different results from what was expected in the follow-up patients. Endoscopic minor complications could not be included in the retrospective study of this nature, neither could they be seriously talked about. Only the lethal ones were mentioned.

Patients with hydrocephalus were not included in this study, therefore, shunt-related dysfunctions were also considered not important. Major cerebral bleeding events that prompted the procedure to execute, in need of the unplanned EVD insertion, or the postoperatively detected bleedings that ensued have required a series of other surgeries. The most common complications that can occur in practice are those that are directly linked to biopsy, the opening of the third ventricle, or the endoscopic navigation. The other forms of bleeding disorders were not at all tolerated. CSF examination and a positive culture test were among the findings that helped to diagnose bacterial meningitis or ventriculitis. Reoperation wherein a second operation was performed has been the complication even if EVD was inserted the second time, but if it was an emergency then it was not counted as a second surgery. The data were collected manually by the researcher personally with the help of a designed proforma by using paper and pen. Computer-based statistical data were analyzed by SPSS version 23 for all the data taken. Categorical variables were the frequency, and the percentage was calculated as continuous variables are achieved by the mean and the standard deviation.

3. RESULTS

After performing a successful biopsy on forty cases, the histopathological diagnosis
was established. Glioma grade II happened to be the most common and it issued
by 5 out of 40 patients. Four (10%) patients presented with either high-grade
glioma (III & IV) or cysticercosis. This means that each had pilocytic astrocytoma, pineoblastoma, and germinoma seen in three (7.5%) patients. In addition, there were two (5%) cases of both cryptococcosis and epidermoid tumor and craniopharyngioma, kleekoleuc', medullo-a-mastaa (metastasis), paracoccidioidomycosis and toxoplasmosis respectively. Apparently, non-specific changes were noticed in three (7.5%) biopsies, one being a normal tissue (2.5%) sample. Table-I

Out of total samples, 12 were reconfirmed by new sample; compatibility with ongoing treatment was observed in 13 patients while follow-up diagnosis matched in 8 patients. Diagnostic accuracy for 33 (82.5%) samples might come from these facts: total 5 (12.5%) were misdiagnosed because new biopsy results differed in three cases, one patient had clinical course that did not go along with her diagnosis and another was reported on inconclusive findings. Of 40 biopsies, we could study all

but two as one patient died and another could not participate anymore. Table-II

Table-I
ANA identification of 40 biopsy samples using histopathological examination

Diagnosis	Number	Percentage
Glioma grade II	5	12.5 %
High-grade glioma (III & IV)	4	10.0 %
Cysticercosis	4	10.0 %
Pilocytic astrocytoma	3	7.5 %
Pineoblastoma	3	7.5 %
Germinoma	3	7.5 %
Cryptococcosis	2	5.0 %
Epidermoid tumor	2	5.0 %
Craniopharyngioma	2	5.0 %
Leukoencephalopathy	2	5.0 %
Medulloblastoma (metastasis)	2	5.0 %
Paracoccidioidomycosis	2	5.0 %
Toxoplasmosis	2	5.0 %
Non-specific	3	7.5 %
Normal tissue	1	2.5 %

Table-II
The changes in the diagnostic accuracy of neuroendoscopic biopsy results

Results	N (%)
Accurate	
Diagnosis confirmed by new sample	12
Diagnosis compatible with treatment response	13
Diagnosis compatible with follow-up	8
Total accurate	33 (82.5%)
Inaccurate	
New biopsy results varied	3
Clinical course not align with diagnosis	1
Indecisivefinding	1
Total inaccurate	5 (12.5%)
Total included	38
Excluded	
Death	1
Lost follow up	1
Total excluded	2 (5.0%)
Total biopsies	40

4. DISCUSSION

In the recent years much research has been progressed to know about the approach to be adopted to handle the lesion in intraventricular and periventricular zones by endoscopic biopsy. The capturing of new diagnosis for this type of relation based diagnostic yield was further identified to have an upper limit and it was found to be 69. 6 percent and 100 percent it's range which partial can explain part of the rationale [10, 11, 12]. The previous research was only focused on tumors only [10, 11] and in this study specific site tumors were analyzed such as pineal region and age limited brain tumor children. In addition to the above mentioned some other factors that were identified to affect the success rates included the use of rigid instead of flexible endoscope [14], size of the tip of the tumor forceps cup [10 14], number of biopsies obtained [14] and level of experience of the endoscopist [6 10 15 16]. On the other hand, as per literature review, conclusions drawn from previous studies mentioned that the most important factor was HOW authors feel about the correctness of the technique. For instance, some authors excluded the patients with the biopsies that did not yield by their investigation [10] while the others provided the diagnosis of even histopathological changes [11, 12, 17].

The fact that the biopsy results combined with difficult to interpret histopathological findings were not regarded in order to begin a possible treatment. Depreitere et al in a research article noted that level I diagnosis of pathological reports have no doubt that any diagnosis is correct, level II has certain doubts but puts forward strong arguments in favor of preferred diagnosis, level III hasinvorarily abnormal or neoplastic tissues but often has difficulty quoting an exact diagnosis, and level IV is not pathological at all and has no explanation [18].

In the survey of Constantini et al, in which 293 cases from different countries were examined, 78 patients had an open surgical operation because it was believed that their biopsy should yield informative results. The comparison revealed that 82 percent had absolutely similar diagnosis while in 6 percentcases only the diagnostic label varied. 4% the diagnoses were somewhat different, yet relevant and in 11. Interestingly, these were 5%, although mismatched were meaningful diagnosis [6].

This type of research was conducted in order to find a solution from methodological problems as our study encompassed all categories of patients including those without neoplastic disease. However, even where diagnosis is perfect as depicted in this paper, not all patients would be expected to react in the same manner to these treatment approaches. Finally, patients that complied with the treatment regimens had a different disease progression than those that departed from it. Furthermore, if at all there was such a thing as methodological issues, it obtains to the results of this study.

Endoscopic biopsy was associated with overall low levels of mortility and mortality rates. Minor complications considered as irrelevant in the scope of the study were not included in retrospective analysis though they were considered and ignored. The major complication was hemorrhage and it was most worrisome while performing endoscopic procedure. Despite the fact that hemorrhage is an overarching term, existing authors use the term “significant hemorrhage” in a rather wide manner. In some of the prior studies, scholars have used varying degrees of complicating factors, whereby; they are divided into mild, moderate or even severe [6, 11&12]. To the best of our knowledge, a “significant hemorrhage” is bleeding which requires the placement of an EVD, results in a carried out operation, and where sufficient management requires surgery later.

5. CONCLUSION

The outcome of our study was the new method of assessing the accuracy of endoscopic biopsy which revealed high accuracy in diagnostic biopsy. The findings also indicated that this method was safer and effective than previous approaches used to assess the accuracy.

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