

Atypical Delayed Development of Clinically Symptomatic Biopsy Tract and Intratumoral Hematoma on Seventh Day Following Biopsy of Intracranial Tumor: Review

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Abstract

Neurological worsening in case of supratentorial glioma within a week following biopsy procedure, can be caused by fresh onset hydrocephalus, worsening of pre-existing hydrocephalus, seizure, abscess, meningitis, acute enlargement of peritumoral edema or tumor bleed. Authors report a -40 year - female, who underwent ultrasound guided biopsy of right thalamic mass lesion, and histopathological report was glioblastoma multiforme and discharged on second day following biopsy. The immediate post-biopsy CT scan revealed presence of air pocket at site of biopsy, however, no hematoma was present. On seventh days following biopsy, she again presented to neurosurgical services with complaint of fresh onset neurological worsening, CT scan head revealed an unexpected intra-parenchymal subcortical delayed hemorrhage along the biopsy tract, inside the tumor at the site of biopsy. To the best of knowledge of authors, current case is the first report in the western literature, which developed delayed hematoma on seventh day following biopsy and underwent successful hematoma evacuation and subtotal decompression of thalamic glioma. Author recommends possibility of hematoma development during immediate follow-up period must be kept as one of differential diagnosis for neurological worsening, who underwent recent biopsy of intracerebral lesion. Possible mechanism, management and pertinent literature are reviewed.

Keywords

Glioma, Delayed Hemorrhage, Biopsy Tract, Ultrasound Guided Biopsy, Intracerebral Lesion, Management

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1. Introduction

Intracranial spontaneously hemorrhage can be encountered in about 6% cases harbouring intracranial tumours and hemorrhage being more commoner in gliomas, intracranial metastasis and pituitary adenomas. [1, 3, 5, 8, 9] Diagnosis of intracranial lesion need histopathological confirmation, so that exact diagnosis is ascertained and accordingly further planning regarding surgical intervention or combination treatment with adjuvant therapy or in case of inflammatory pathology appropriate medication may be provided. [10-12, 13-19] However, specimen can be retrieved either through

craniotomy or biopsy procedure. Biopsy can be performed under guidance of ultrasonography, stereotactic or under frameless neuronavigation. The computerized tomography guided stereotactic biopsy is an established method of performing biopsy of cerebral lesions. Minimally invasive biopsy by stereotactic or ultrasonography guided procedure [2-5, 12.20-22] has been demonstrated to be a low risk procedure and can be performed with extreme accuracy [5] especially with use of recent advanced system compatible with CT scan and MRI or modern ultrasonography guidance.

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2. Case-Illustration

A 40-year-old female presented with complaint of gradual onset, gradually progressive weakness involving left side of body for two months. Examination on admission, she was conscious and alert, vitals were stable left sided seventh cranial nerve paresis along with left sided spastic hemiparesis of grade 4/5. Deep tendon jerks were brisk on left side of body with Babinski positive. Routine hemogram and biochemistry were within normal limit. The contrast enhanced computed tomography scan of head revealed mass lesion involving the right thalamus causing severe mass effect causing compression of ipsilateral lateral ventricle and subfalcine herniation. Magnetic imaging study of brain could not be carried out as she was claustrophobic.

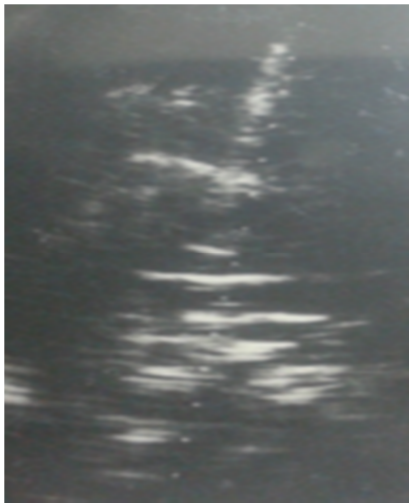


Fig. 1. Intra-operative ultrasonographic image of right thalamic mass lesion after making burr hole and opening the dura, mass lesion in the of right thalamic region.

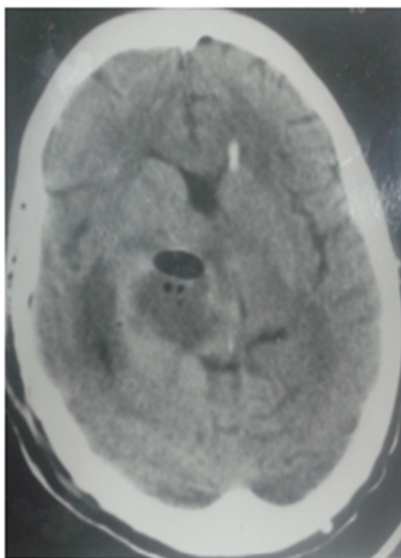


Fig. 2. Non-contrast CT scan, head, axial section image revealing presence of air pocket in the region of right thalamic glioblastoma multiforme after undergoing ultrasound guided biopsy.

A plan for ultrasound guided biopsy was made. She was shifted to operation theatre, and under local anaesthesia, after making burr-hole and opening the dura lesion was localized in the right thalamic region. Intraoperative ultrasonographic image showing distance of lesion from the cortical surface to right thalamic lesion (Fig-1). Serially four specimens of biopsy were obtained inclusive of centre, periphery of the lesion. A routine post-biopsy CT scan head, six hours following the stereotactic biopsy procedure revealed no evidence of hematoma either at biopsy site or along the biopsy tract. However, air bubbles were visualized at the site of biopsy. (Fig-2). Histopathological examination of biopsy specimen revealed features suggestive of glioblastoma multiforme. She had uneventful post-operative period, she was discharged from the hospital on third day following the biopsy procedure.

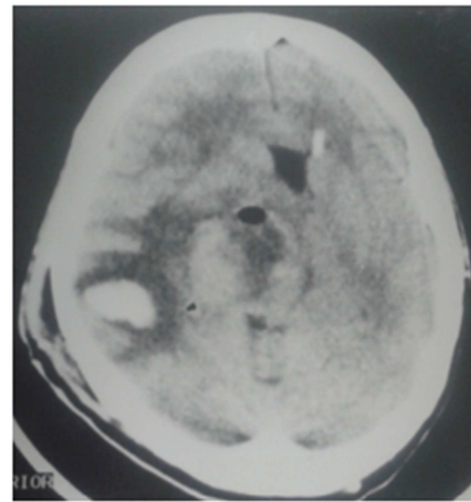


Fig. 3. Non-contrast CT scan of head carried on seventh post-biopsy day, demonstrating delayed appearance of intratumoral and biopsy tract hematoma causing severe mass effect with effacement of sulci and gross midline shift and subfalcine herniation warranting urgent surgical decompression in a case of right thalamic glioblastoma multiforme, with residual air pocket.

She again reported to emergency services on seventh day following biopsy, with the complaint of fresh onset neurological worsening of left sided weakness for the last eight hours. A repeat CT scan head at repeat-admission was carried to evaluate the causes of the neurological deterioration, revealed presence of the large subcortical hematoma along the biopsy tract. (Fig-2) She had no history of fall after surgical biopsy or any hypertensive episodes. Her coagulation profiles were normal. So, a provisional diagnosis of delayed atypical haemorrhage was made. She was taken up for emergency surgical evacuation of hematoma by utilizing osteoplastic right frontotemporal bone flap craniotomy. At the surgery, hematoma was evacuated, hemostasis secured, duraplasty was carried out, wound was closed in layers and she was kept on elective ventilatory support in the immediate post-operative period and gradually weaned off. She was transferred to the radiotherapy department for adjuvant therapy on tenth days following the evacuation of hematoma.

3. Discussion

Current sophisticated neuroimaging can aid to establish a reasonable diagnosis to certain extent, however, considerable attention must be paid during analysis of imaging studies i.e. location, epicentre, morphology, heterogeneous structure, vascular encasement, association of necrosis, cyst pattern of contrast enhancement associated bony or soft tissue changes to avoid misinterpretation but despite confirmatory diagnosis is not possible on neuroimaging. However, biopsy is a minimally invasive method to obtain specimen, which on histopathological examination and Immunohistochemistry can aid in establishing a confirmatory diagnosis and grading of lesion is also possible to a great extent.

Stereotactic biopsy is well established method in diagnosis of intracerebral lesions. Stereotactic biopsy [2-5] has been demonstrated to be a minimally invasive procedure and may be performed with extreme accuracy for mass lesion, irrespective of location, superficial or deep or sizes may be small or large, but also carries risk for neurological deterioration as occurred in our case. [2] Minimally invasive biopsy can be very rarely associated with life threatening complication e.g. intracerebral hematoma, tumor swelling or infarction causing severe rise in the intracranial pressure, leading to transtentorial herniation and associated morbidity and mortality. The diagnostic yield for stereotactic biopsy is about 95%. [1, 3, 9, 12, 20-22]

The reported rate of complication associated with biopsy utilized for intracerebral lesion including temporary and permanent neurological deterioration have a wide range of variation. Multiple factor are associated with variability in the biopsy related complications i.e. size, morphology, consistency, location of lesion, relation to artery and venous sinuses and tributaries, trajectory. [1, 3, 5, 7, 12, 20, 22, 23]

The reported incidence of hemorrhage following biopsy in the literature, picked by postoperative CT scan head differs considerably and range is 0.9 - 8%. [3-5, 22] Kulkarni et al. [4] observed in 59.8 % cases demonstrated on CT scan carried out in the immediate post-biopsy period. However, all were asymptomatic except three cases, who developed delayed neurological deterioration occurred within two days following biopsy procedure.

Field et al [5] reported an incidence of 8 % hematoma formation in their study and all cases were routinely subjected to post- biopsy CT scan usually within 15 minutes of biopsy procedure. However, two of cases developed symptomatic neurological deterioration due to development of delayed intra-parenchymal hemorrhage although no evidence of bleed was observed in the first post-biopsy scans, but both cases also deteriorated within two days following biopsy. In the current

study, our patient underwent biopsy of thalamic lesion, first post-biopsy scan was carried at six hours after biopsy procedure, which revealed presence of air pockets with no hematoma and was neurologically intact. As our case showed delayed neurological worsening after one week, while case study by Kulkarni et al. [4] and Field et al [5] deteriorated within two days. So, our case is unique in the literature, as she deteriorated in the neurological status after an interval of one week, developed fresh onset intratumoral bleed and also along biopsy tract with gross mass effect with rapid neurological and clinical deterioration necessitating urgent surgical evacuation. To the best knowledge of author, current case in first reported in the world literature, who deterioration on seventh day following biopsy and also requiring urgent surgical evacuation.

Kreth et al [8] experienced relatively lower incidence of 9.6 % bleeding complication rate inclusive of silent as well as manifest bleeding, who underwent biopsy of intra-axial brain tumor, further observed bleeding were more commoner in higher grade of glioma cases and concluded malignancy grade may correlate well to incidence of post-biopsy hemorrhage. The high-grade malignancy has the highest tendency to bleed.

The incidence of spontaneous bleeding in the intracranial tumours is about 3.9%. [13] In the primary intracranial tumour, gliomas are most susceptible to spontaneous bleed and glioblastoma multiforme, oligodendroglioma and mixed glioma has highest rate of spontaneous bleed [14] in the primary intracranial brain tumour, intratumoral hemorrhage is the commonest pattern, followed by intracerebral, and subarachnoid and subdural location. Wakai et al reported the relative incidence of above bleeding pattern were 67%, 15.5%, 15.5 % and 2% respectively. [1]

Exact mechanism of bleed is still remains uncertain. Several hypotheses are proposed to explain the principal mechanism responsible for intracranial tumour bleed. The blood supply of tumour is running short of the requirement, leading to areas of central necrosis formation and it is commonly attributed to be responsible for bleed inside metastatic deposit. Even structural disintegration of tumor vessel is also another important factor. The endothelial proliferation along with microvasculature of glioblastoma disposes a network of dilated, and sinusoid with thin wall. [17] These microvasculature can undergo to progressive thrombosis, which can cause tumor infarction thus increasing tendency of bleed. Kreth et al [8] postulated vascular proliferation and sinusoidal structure was noted in the tumour as well as in the widespread surrounding reasons in the higher grade glioma, these pathological factors may be responsible for similar delayed hematoma formation as observed in our case also, detected on seven days following the biopsy.

Kulkarni et al [20] advocated, asymptomatic cases, who underwent biopsy of intracranial lesion can be discharged on the same day of biopsy procedure, where post-biopsy CT scan have no evidence of hematoma, while, Field et al [3] advised overnight hospital observation after biopsy is must even in those cases carried no evidence of bleed in the CT scan head carried out in the post biopsy period. The post biopsy scan in our case did not showed evidence of hematoma; she was discharged after two days of hospital stay following the biopsy procedure. Unusually our patient developed late neurological deterioration on seventh postoperative days. There was no evidence of coagulation disorder, head injury, seizure or hypertensive episode after biopsy. So our recommendation is for regular monitoring by local physician and for constant vigilance for at least one week period following biopsy is must as over a week period, patient can develop delayed post-biopsy intracerebral bleed and regular follow-up thereafter.

4. Conclusions

In patients harbouring intracranial malignancy and developing fresh neurological worsening even after one week, who underwent biopsy procedure, delayed hematoma formation should also be kept as rare but very important cause. Neuroimaging study must be carried out to exclude such bleed, if present, which may require urgent microneurosurgical evacuation; otherwise delay may lead to catastrophic neurological worse outcome. An urgent imaging study is advised to ascertain the exact cause and tailored made treatment planning should be instituted at the earliest opportunity to provide good neurological as well as clinical, and functional outcome.

References

- [1] Scott M. Spontaneous intracerebral hematomas caused by cerebral neoplasms. *J Neurosurg*, 1975; 42: 338-342.
- [2] Apuzzo MLZ, Sabshin JK et al. Computed tomographic guidance stereotaxis in the management of intracranial mass lesions. *Neurosurgery*. 1983; 12: 277-85.
- [3] Lorenzo ND, Esposito V, Lunardi P, et al. A comparison of computerized tomography – guided stereotactic and ultrasound – guided techniques for brain biopsy. *J Neurosurg* 1991; 75: 763-765.
- [4] Kulkarni AV, Guha A, Loranzo A, et al. Incidence of silent hemorrhage and delayed deterioration after stereotactic brain biopsy. *J Neurosurg* 1998; 89: 31-35.
- [5] Field M, Witham TF, John C, et al. Comprehensive assessment of hemorrhage risks and outcomes after stereotactic brain biopsy. *J Neurosurg* 2001; 94: 545-551.
- [6] Lunardi P, Acqui M, Maleci A, Di Lorenzo N et al. Ultrasound guided brain biopsy: a personal experience with emphasis on its indication. *Surgical Neurology* 1993; 39(2): 148-151.
- [7] Benediktsson H, Andersson T, Sjolander U et al. Ultrasound guided needle biopsy of brain using an automatic sampling instrument. *Acta Radiol* 1992; 33(6): 512-517.
- [8] Duthel R, Portafaix M. ultrasonically guided biopsy of cerebral tumors. *Neurochirurgie*.1986; 32(6): 547-552.
- [9] Fujita K, Yanaka K, Meguro K, Narushima K, et al. Image – guided procedures in brain biopsy. *Neurological – Medico-chirurgia*.1999; 39 (7): 502-509.
- [10] Dohrmann GJ, Rubin JM. Use of Ultrasound in neurosurgical operations; A Preliminary Report. *Surgical Neuro*1981; 16: 362-366.
- [11] Rajshekhar V, Ranjan A, Joseph T, et al. Non-diagnostic CT-guided stereotactic biopsies in a series of 407 cases: influence of CT morphology and operator experience. *J Neurosurgery* 1993; 79: 839-844.
- [12] Yutaka T, Anodh Y, Inoue N. Ultrasound-guided biopsy for deep –seated brain tumors. *J Neurosurg*.1982; 57: 164-167.
- [13] Salcman M. Intracranial hemorrhage caused by brain tumour. In: Kangman HH (Ed) *Intracerebral hematomas*, New York, Raven Press, 1992, pp95-106.
- [14] Kondziolka D, Bernstein M, Resch L et al. Significance of hemorrhage into brain tumours: Clinicopathological study. *J Neurosurg* 1987; 67: 852-857.
- [15] Wakai S, Yamakowa K, Monaka et al. Spontaneous intracranial hemorrhage caused by brain tumours, its incidence and clinical significance. *Neurosurg*, 1982; 10: 437-444.
- [16] Kohli CM, Crouch RL. Meningioma with intracerebral hematoma. *Neurosurg*; 1984; 15: 237-240.
- [17] Liwnicz BH, Wusz, Tew JM. The relationship between the capillary structure and haemorrhage in gliomas. *J Neurosurg*1987; 66: 536-541.
- [18] Glands B, Abbott KH. Subarachnoid hemorrhage consequent to intracranial tumour. Review of the literature and report of seven cases. *Am Med Assoc Arch Neurol Pshychia* 1955; 73: 369-379.
- [19] Cowel RI, Siqdra EB, George E, Angiographic demonstration of glioma involving the wall of anterior cerebral artery: Report of a case. *Radiol* 1970; 97: 577-578.
- [20] Kreth FW, Muacevic A, Medele R et al. The risk of hemorrhage after image-guided stereotactic biopsy of intra-axial brain tumors - a prospective study. *Acta Neurochir* 2001; 143: 539-545.
- [21] Leksell L. Echo–encephalography Detection of intracranial complications following head injury. *Acta Chir Scand*. 1956; 110: 301-315.
- [22] Woydt M, Krone A, Sorensen N, Roosen K, Ultrasound-guided neuronavigation of deep-seated cavernous haemangiomas: clinical results and navigation techniques. *British Journal Neurosurg* 2001; 15: 485-495.
- [23] Enzmann D R, Irwin KM, Fine M, et al. Intraoperative and outpatient echo encephalography through a burr hole. *Neuroradiol* 1984; 26: 57-59.