

Original Research Article

Pre-Operative Shunt Vs Attack With Safety Burr Hole In Obstructive Hydrocephalus Complicating Medulloblastoma

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Abstract

A prospective study of 50 patients with obstructive hydrocephalus complicating medulloblastoma in posterior fossa (malignant tumors formed from primitive or poorly developed cells at a very early stage of life) with a histopathologically proved medulloblastoma. The patients had different age group and from different geographical regions in Iraq. The aim of this study was to clarify the best method for treating hydrocephalus associated with these tumors. And compare in outcome with patient treated with preoperative shunt and those with direct attack with safety burr hole or direct attack only and our results. In those patients that shunt operation was conducted before tumor resection there is improvement in their clinical condition before tumor resection leading to lax brain during operation. CSF diversion was recommend before tumor resection is recommended for most patients especially for those with midline solid tumors.

Key words: ICP, CSF, CT-scan, Computerized axial tomography, MRI, Burrhole.

الخلاصة

دراسة لخمسون مريضاً مصاباً بموه الدماغ المصاحب لورم ارومي نخاعي في الحجرة الخلفية (وهو من الاورام الخبيثة التي تشكلت من خلايا بدائية في مرحله مبكره من النمو) مثبت حسب الفحص النسيجي وكان المرضى من فئات عمرية مختلفة ومن مناطق جغرافية مختلفة. الهدف من هذه الدراسة هو ايجاد افضل الطرق لمعالجة موه الدماغ المصاحب للورم الارومي ومقارنة النتائج بعد رفع الورم للمرضى الذين اجري لهم صمام بريتوني والمرضى اللذين لم يجرى لهم صمام بريتوني. للمرضى اللذين تم عمل صمام بريتوني لهم في البداية كانت عملية رفع الورم اسهل لانه لا يوجد زياده في ضغط الدماغ. ان وضع صمام بريتوني قبل عملية رفع الورم افضل في معظم المرضى اثناء وبعد عملية رفع الورم لتجنب المضاعفات الناتجة عن تأثر المخيخ وخاصة اذا كان الورم صلب وفي منتصف الحجرة الخلفية.

Introduction

The term "medulloblastoma cerebelli" was first defined in a report by Bailey and Cushing describing 29 patients in 1925 [1]. The most recent World Health Organization classification of brain tumors maintains the term "medulloblastoma" for posterior fossa undifferentiated tumors[2]. This tumor accounts for approximately 7-8% of all intracranial tumors and 30% of

pediatric brain tumors[3]. Medulloblastomas are malignant tumors formed from primitive or poorly developed cells at a very early stage of life. Like most brain tumors the cause of medulloblastoma is unknown. This embryonic tumor arises from undifferentiated neuroepithelial cell in the cerebellum. It occurs principally in the midline cerebellar region, but it prone to invade the meninges & CSF spaces. & may

spread to other parts of the brain, and very rarely to other parts of the body. This spread is usually via the cerebrospinal fluid (CSF). [4,5]. The peak of incidence was between 3–8 years[6]. 14-30% occur in adults, accounting for 1% of adult central nervous system tumors.[7] A male predilection has been observed, with 1.5-2:1 times more cases in men than in women being reported [8,9,10]. There is no geographical localization of the residency of children with medulloblastoma[11]. Because the fourth ventricle is the preferred site of medulloblastoma, the most common presenting clinical signs are those referable to increased intracranial pressure owing to obstruction of the flow of CSF and resulting hydrocephalus[12]. Presenting symptoms may be different according to the age of the patient [11,13]. The most frequent symptoms were headache (64%) and vomiting (64%) [14]. Timing of surgery will depend on the degree of hydrocephalus and state of the patient. Pretreatment with steroids is thought to be beneficial and is always done, especially when there is some delay in surgery. If possible, steroids are not given until after the enhanced CT scan, as this may alter the enhancement. Anticonvulsants are not routinely used in posterior fossa surgery. Preoperative antibiotics are not needed; but intraoperative antibiotics effectively decrease the risk of postoperative infection[15,16]. Controversy still exists regarding the initial management of the patient with posterior fossa tumors. Elective V-P shunting had been carried in most patients with obstructive hydrocephalus prior to definitive tumor surgery, which was typically deferred for 7 to 10 days until the child's papilledema & other symptoms & signs had resolved [12]. Insertion of precraniotomy shunt improves the clinical features of raised I.C.P. It also provided a lax brain during definitive surgery & a smooth postoperative course[17,18]. Disadvantage of pre-resection shunting include the risk of upward transtentorial herniation (4% of

patients), necessitating emergency decompression of the posterior fossa [12], & the potential dissemination of malignant tumor cells through the shunt (4 % of medulloblastoma patients) [19].

The aim of the study was to clarify the best method for treating hydrocephalus associated with these tumors and to compare in outcome with patient treated with preoperative shunt and those with direct attack with safety burr hole or direct attack only.

Materials and Methods

A prospective study was achieved on 50 patients admitted to neurosurgical department of Specialized Surgical Teaching Hospital, Al-Kadhemia Teaching hospital & Ghazi Hariri hospital for specialized surgery in Baghdad during 2005, 2006 & 2007 with histopathologically proved medulloblastoma. The patients had different age groups; children and adults (age 16 years and above) from different geographical regions in Iraq were included in this study. All the patients were admitted and investigated, Funduscopic examination was done for all patients with medulloblastoma. CT scans were done for all patients, with and without contrast enhancement, the tumor dimensions, site, density, type, mode of enhancement, calcification & associated hydrocephalus have been identified. MRI studies were done for 14 patients only. (mostly for large tumors that reaching the brain stem to show if the brain stem involved or not). All patients received and tapered postoperatively. Antibiotics therapy was started with the induction of anesthesia & continues for 7 days postoperatively. For treatment of the associated hydrocephalus patients were divided into 4 groups: elective shunt (I), emergency shunt (II), direct attack with safety burr hole (III), & direct attack only (IV). All Shunt operations was ventriculo-peritoneal most of them posterior parietal burrhole and in lesser degree frontal burrhole depending on preference of surgeon. Patient

condition post shunting was evaluated as being improved, deteriorated or stationary. We followed up the patients during hospitalization for the development of early complications & for variable time after

discharge from hospital. After we reach the type of tumor from the histopathological Lab the patients were referred to the oncologist for adjuvant therapy.

Results

Figure 1: Incidence of presenting symptom

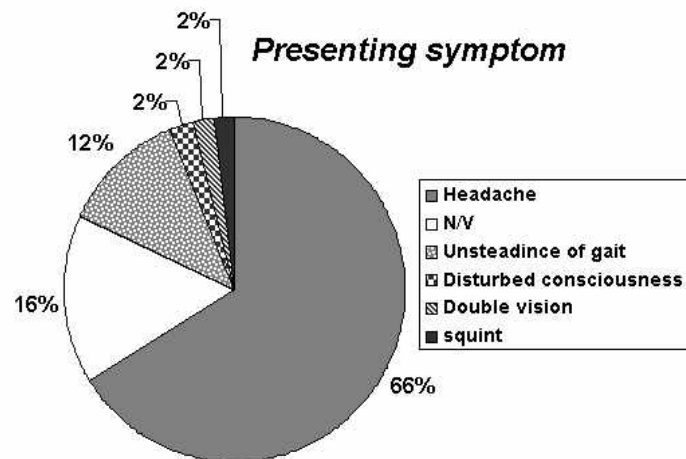


Figure 2: Funduscopy examination

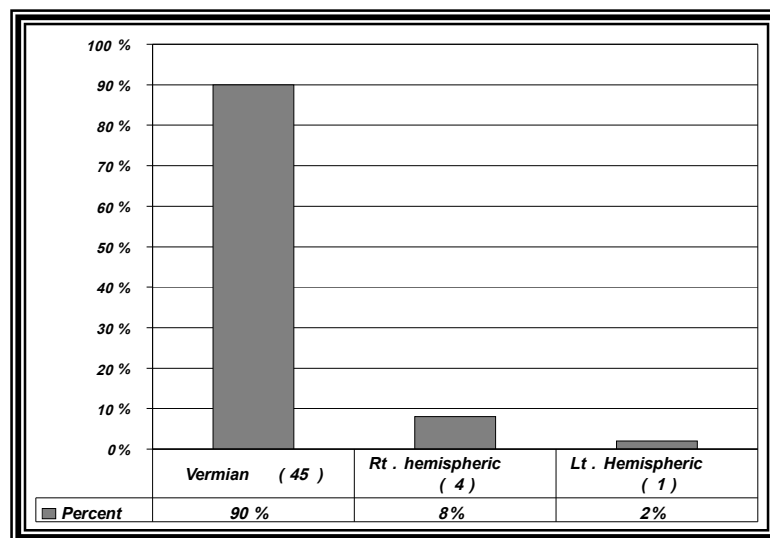
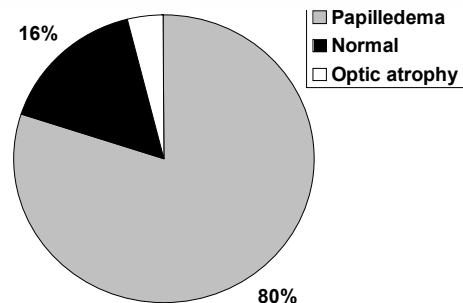
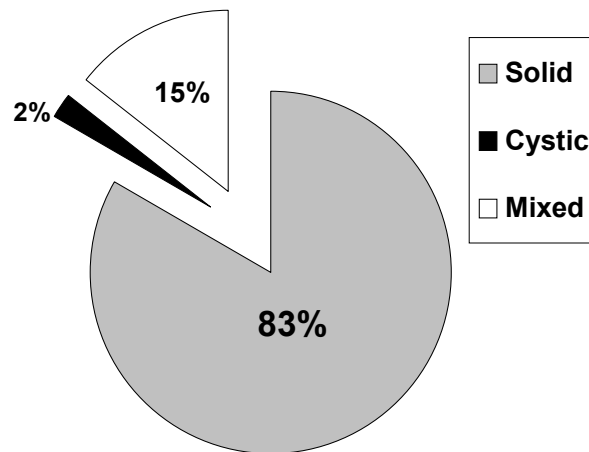


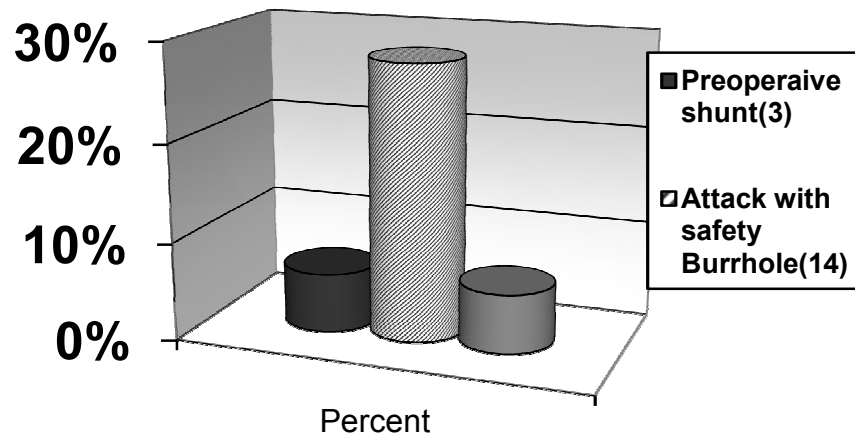
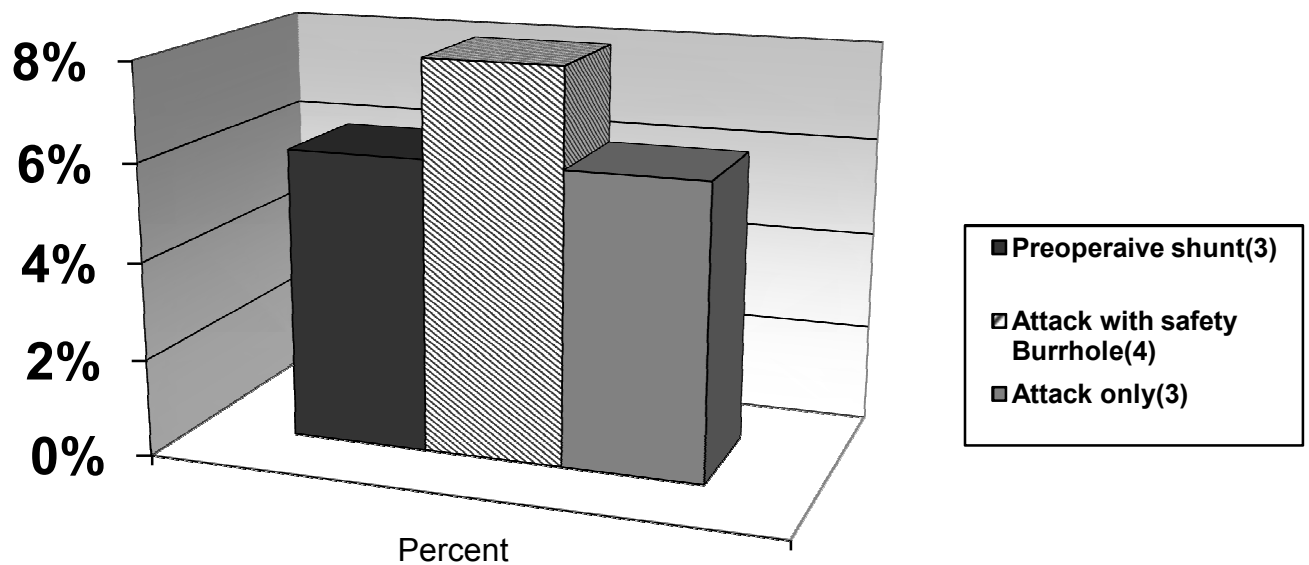
Figure 3 : Tumor Location

Table 1: Types of tumor in CT-scan

<i>SITE</i>	<i>Types of tumor in CT-scan</i>			
	Solid	Cystic	Mixed	Total
Vermian	40 (80%)	----	5 (10%)	45 (90%)
Lt. hemispheric	----	----	1 (2%)	1 (2%)
Rt. hemispheric	2 (4%)	1 (2%)	1 (2%)	4 (8%)
Total	42 (84%)	1 (2%)	7 (14%)	50

**Figure 4:** Type of tumor in CT-scan & MRI

CSF diversion procedure		Site of ventricular catheter		
		Frontal	Posterior parietal	Total
Shunt	Elective	5	16	21(42%)
	Emergency	1	3	4(8%)
No shunt	Attack + safety burr hole	---	---	22(44%)
	Attack only	---	---	3(6%)
	Total			50

Table 2: Modes of CSF diversion**Postoperative Ataxia****Figure 5:** Trunkal ataxia worsening after removal of tumor in relation to CSF Diversion procedure**Postoperative Nystagmus****Figure 6:** Postoperative Nystagmus in relation to CSF diversion

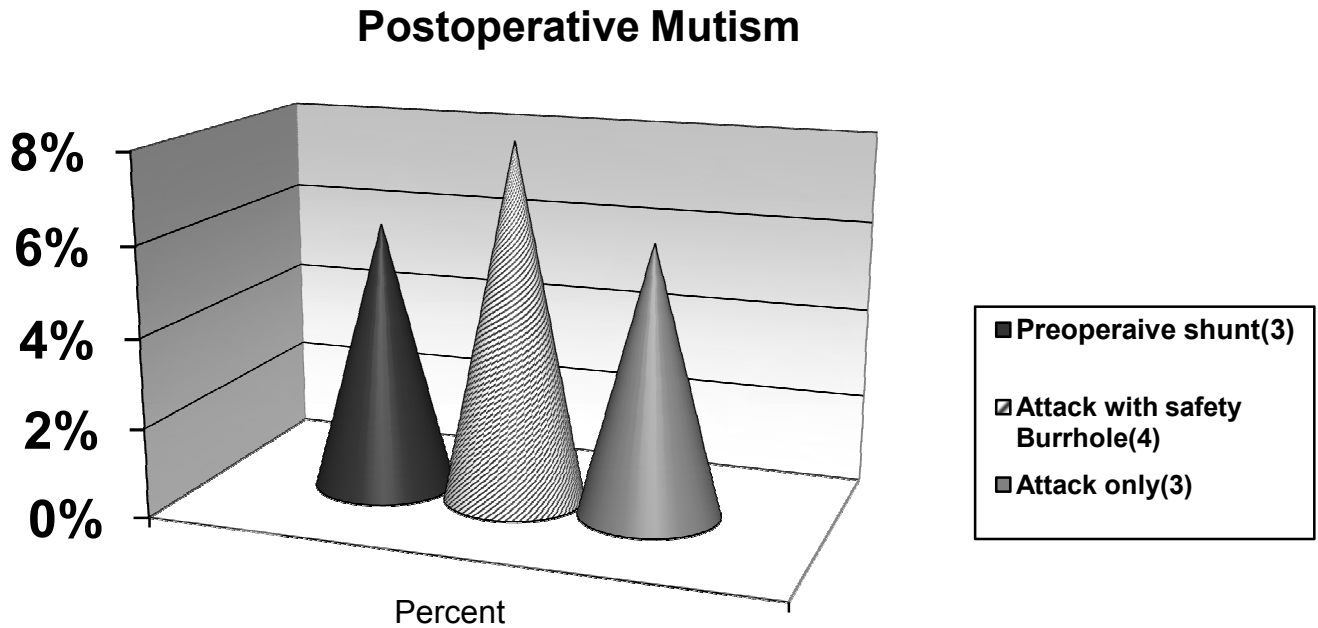


Figure 7: Postoperative Mutism in relation to CSF diversion

Discussion

The most common presenting symptoms are those related to increased I.C.P. because the preferred site of this tumor is forth ventricle causing obstruction of the flow of CSF resulting hydrocephalus. In this study the most frequent symptom was headache in 66% of cases, The second presenting symptom were vomiting and it founded in all patients presented with headache explained by endocranial hypertension or direct pressure on medullary emetic center or both, the same results encountered by Reis-Filho-JS and Gasparetto-EL[14]. Unsteadiness of gait that is caused by the cerebellar compression and, more significantly, by coexisting hydrocephalus[20] is the third presenting symptom and it may be the earliest symptom encountered by patients. Symptoms of unilateral cerebellar dysfunction are uncommon because of the common occurrence of medulloblastoma in the vermian location. Other symptoms encountered less frequently like visual impairment, squint, double vision which

may occur as a consequence of hydrocephalus, the sixth cranial nerve can be compressed at the petroclival ligament, resulting in diplopia and lateral gaze paresis. Generalized epilepsy occur in 6 patients; control of hydrocephalus had positive influence on control of seizure because hydrocephalus cause significant changes in cerebral blood flow as well as in the size of electrolyte character of extracellular space changes secondary to hydrocephalus process [20]. Fundoscopical examination is very important and it was done to all patients in this study to show papilledema which indicate the increase in I.C.P. Raimondi and Tomita reports the incidence of papilledema as 66.7-76% [20], slightly higher incidence in this study of papilledema as 80% of patients while 16% of patients had normal Fundoscopical examination so normal fundoscopical examination doesn't mean to send the patient to home but he need more investigations. Visual difficulty usually is due to papilledema; however, it also may originate from cranial nerve

palsy. Cerebellar signs are the second most common signs like ataxia in 60%. All the patients had one or more signs of cerebellar dysfunction. Brain stem dysfunction are the third most common signs like weak gag reflex in 18%, abducent nerve palsy in 18% and facial palsy in 10%. In this study CT-scan was the main diagnostic study because of its availability and short time of scan which make it suitable for children. In this study the tumor most commonly on precontrast CT-scan was a well-defined homogenous hyperdense lesion due its high cellularity. Medulloblastoma is located very frequently in the vermis in (90 %), occupying the fourth ventricle and compressing the brain stem ventrally, Rt. hemispheric in (8%) & Lt. hemispheric in (2 %). As in the literature of Bourgouin, P. M. & Koci, T. M. the vermian location is the most common one [21, 22]. From its midline location the tumor cause hydrocephalus leading to short duration of symptoms while cerebellar hemisphere location is more benign with longer duration hydrocephalus and symptoms. Most patients with obstructive hydrocephalus By CT-scan & MRI study the tumor was solid in (83%) patients. The same as in Karoly et al study in which the tumor was solid in 80-90% of patients with obstructive hydrocephaly [23]. Treatment with steroids before surgical exploration was done for all patients and it give good results in decreasing I.C.P. symptoms, especially when there is some delay in surgery. Preoperative antibiotics are not needed; but intraoperative antibiotics were given. Antibiotics therapy was started with the induction of anesthesia & continues for 7 days postoperatively. Shunt operation was conducted before tumor resection in 50% of patients from them 42% of shunt procedures were elective and 8% were emergency shunt because of severity headache and vomiting of some patients due to increase I.C.P., all shunt procedures were ventriculo-peritoneal & the site of the

shunt either frontal or posterior parietal. Half of patients treated without shunt operations either with attack with safety burrhole (44%) or with attack only (6%). In this study the risk of supratentorial herniation after shunt operation were not reported because the type of shunt used were medium pressure. Also dissemination of tumor through the shunt was not reported and this may be because of small number of patients in this study. Insertion of precraniotomy shunt improves the clinical features of raised I.C.P. in most of cases. Goel & Berger in there literatures agreed with this result and it also provided a lax brain during definitive surgery & a smooth postoperative course. [17,18] in contrast to those with attack with safety burrhole or attack only. All the patients underwent surgical exploration by suboccipital craniectomy. Postoperative CT scan was done to evaluate the extent of tumor removal & the degree of hydrocephalus. In those patients without shunt three of them need post-operative shunt due to partial removal of tumor because the tumor involves brainstem. The most common postoperative complications in this study were a temporary worsening cerebellar dysfunction mostly in ataxia and nystagmus in about 40% of patients mostly those without pre-operative shunt. The ataxia mostly truncal in nature and this is due to vermian incision in the operation. George Jallo & Berry in there literatures agreed with this results and this complication often rapidly resolves over several weeks. [24,3,8] Cerebellar mutism as a postoperative complication reported as a second complication after cerebellar dysfunction (20% of patients mostly in those without shunt) in which the tumor was midline in all of the cases and vermian incision was used with total removal of the tumor and it developed 2-5 days after surgery and recovery of mutism between 1-6 months. The mutism resolved in all cases with no residual neurological

deficit. Mutism in this study nearly the same as in the literature of Ersahin&Mutluer[25].

Conclusion

Because the fourth ventricle is the preferred site of medulloblastoma, the most common presenting clinical signs are those referable to increased intracranial pressure including headache and vomiting; leading to misdiagnosis as a gastrointestinal disorder leading to late referral to neurosurgery. Medulloblastoma is located very frequently in the midline and the tumor was solid in most of cases. Obstructive hydrocephalus presented in most patients leading to sign and symptoms of increase ICP.

In those patients that shunt operation was conducted before tumor resection there is improvement in their clinical condition before tumor resection leading to lax brain during operation.

Control of hydrocephalus had positive influence on control of seizure. Post-operative cerebellar ataxia & nystagmus less in patients with preoperative shunt. Post-operative mutism in patients with preoperative shunt.

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