

Comparative Study between two neurosurgical methods in treatment of the deep-seated malignant brain tumor

Dr. Hayder . M. Ali

ABSTRACT

Objectives : This study is aimed to alert the neurosurgeon about significant of the burr-hole plus D. X. T. in median survival in treatment of the deep-seated malignant brain tumor (highly malignant astrocytoma) .

Methods : Throughout a period of 5 years – 50 cases which were proved and diagnosed by brain CT scan , brain MRI and histopathological examination as cases of deep-seated malignant brain tumor " malignant glioma , Astrocytoma Grade III , IV " I divided these 50 cases into 2 groups , the 1st group was 25 cases which was treated by burr-hole biopsy plus deep X. therapy while 2nd group was treated by formal , classical craniotomy flap with subtotal excision of the tumor plus deep . X. therapy all the cases were operated Al-Kadhimyah Teaching Hospital , Al-Mosawy private hospital and Al-Saady Hospital in the Al-Basra city .

Result : We found there is no wide difference between these two neurosurgical methods in relation to the median survival in treatment of the deep-seated malignant brain tumor .

Conclusion : The use of surgical technique of a burr hole plus D.X.T indicated the need for the use of the stereotactic surgery , therefore that a burr-hole plus D. X. T is to be recommended as a usual method of neurosurgery to treat a deep-seated malignant brain tumor " Astrocytoma Grade III , IV .

Key words : burr-hole . median survival . craniotomy .

*M. B. Ch. B. F. I. M. S. Neurosurgeon Thi-Qar University – College of Medicine
Al-Hussein Teaching Hospital

INTRODUCTION

The term malignant glioma encompasses several different tumors. Among these are anaplastic astrocytoma "AA", glioblastoma multiforme (GBM), gliosarcoma and malignant oligodendroglioma (m.o) whether these tumors represent a histologic spectrum of disease with a common cell of origin remains an issue of debate^(1,2). Clinically differences in prognosis and response to therapy exist among these tumor types. These differences in biologic behavior underscore the importance of accurate histopathologic diagnosis in the management of patients with presumed malignant glioma. Malignant astrocytoma are the most common primary cerebral neoplasm in adults. Although these neoplasms make up only 2% of all adult-tumors, occurring at rate of approximately five cases per 100,000 adults per year. They are the fourth most common cause of cancer-related deaths^(3,4). Anaplastic Astrocytoma and glioblastoma multiforme are highly age specific. The incidences for population younger than 14 years of age are 0.5 and 0.2 respectively⁽⁵⁾. Although improved detection through the use of magnetic resonance imaging "mRI" and computed tomography "cT" can partially explain the apparent doubling of the incidence of glioblastoma multiforme during the past decade in patient older than 75 years, this trend remains unexplained⁽⁶⁾. Glioblastoma multiforme appears to be slightly more common in men, with a male to female ratio of 1.6 : 5. Similarly, the ratio for anaplastic astrocytoma appears to be about 1:5. Along racial lines, anaplastic astrocytoma and glioblastoma multiforme are less common among African Americans⁽⁷⁾. There appears to be little difference in the rate anaplastic astrocytoma and glioblastoma multiforme from nation to nation⁽⁸⁾. The one notable exception is the increased rate of death

from brain cancer in Japan. Although this rate of increase may reflect an overall increase in death rate associated with all cancers⁽⁹⁾.

Histopathology and Grading :

The malignant gliomas grow by invasion, limiting the efficacy of surgery and other local therapies⁽¹⁰⁻¹³⁾ the motility of malignant glioma-cells has been demonstrated in vitro and in vivo using rodent models⁽¹⁴⁾. Motility increases with increasing grade of the malignancy and with exposure to cytokines particularly epidermal growth factor (EGF)⁽²⁹⁾ because EGF is a mitogen and motogen it may play role in local recurrence seen commonly with these tumors⁽¹⁵⁾. Current classification systems for malignant gliomas rely on histologic characteristics. Because gliomas rarely metastasize beyond the C. N. S. The tumor size, nodal status and metastasis (T. N. M) system used for systemic cancer is not applicable. The utility of the particular glioma classification system has traditionally been validated by showing that it can be used to predict length of survival (L. O. S). The W. H. O classification was first published in 1979 is widely used, the W.H.O system is a four tier schema that includes Pilocystic astrocytoma (Grade I) low grade glioma GII Anaplastic glioma (GIII) and Glioblastoma multiforme (grade IV).

PATIENTS AND METHODS

Commencing in September 2003 till the end of the August 2006, All patients who were scheduled neurosurgical intervention necessitating burr hole plus deep X. therapy (D. X. T) and craniotomy with D. X. T were eligible for this study which was carried at the neurosurgical department of Al-Kadymia teaching hospital and Al-Moswy private hospital and al-Saady private hospital. We excluded the patients who were

considered for low grade glioma , patients with other types of brain tumor and those with second surgery . 50 cases were considered to be proper candidates for this study . The vast majority of the patients were males (76%) where are females consisted a minor percentage (24 %) table (2) . The average age of both groups was 55 years the range was between 45 to 70 years . The type of neurosurgery was done on the 1st group as one burr-hole according to the site of the brain tumor by manual craniotomy-set. This group of patient consists of 25 patients . While a 2nd group of patients who were underwent classic or formal craniotomy suitable flap . consists of 25 patients . by using the manual craniotomy-set . All the patients were sent to the deep X. therapy (D. X. T) . The patients were operated in different theaters , with careful selection of the patients was done that is based on the results of the brain CT and brain mRI when these results suggested that patients had actually high malignant and deep-seated brain tumors . for both groups a bolus dose of 1gm of claforen " methotrixem " plus 1gm of Ampeclox which were given I.V 20 – 30 minutes before indication of anesthesia and repeated everyone hour . All precaution were taken to ensure asepsis during neurosurgery in the theater and in the neurosurgical ward . with all measures to diagnose and isolate source of infection . Post-operation dressing-change & removal the sutures was done at 8th post operation days follow up was done , based on the clinical examination brain cT & mRI of the brain . After histopathological result was appeared . We sent the patient to the (D. X. T) inside the our country or to the IRAN to complete their treatment

RESULTS

Age of the patients , two groups are studied the first group with an age above fifth decade , the 2nd group above the

fifth decade , it was demonstrated the highest median survival was in the first group in which the one burr-hole plus D. X. T which were used . Age-incidence table (1) and table (2) had shown that in 52 % of the cases the age was above the fifth decade and the young patients who were under went by the one burr-hole + D. X. T patient had shown a prolonged median survival as shown in the table (1) . The table (2) had demonstrated decreased the median survival in the second group in which the patients who were underwent by craniotomy plus D. X. T in 48 % and 52 % of cases were aged in fifth decade & above fifth decades successively , that means the age of the patient paly a role in the out come in both methods of the neurosurgical technique . Table (3 , 4) that had shown 80 % of cases in the first group were males while 72% of cases were male in the second group and 20 % of cases were female in the 1st group where as 28 % of cases were females in the 2nd group .In both groups there was no sex-difference between both groups in relation to the median survival . The sex-incidence in the table (5) had show that 76% of cases were predominantly male while in 24% of cases were females . This study had demonstrate the male were affected more than females . The effect of the recent computerized machine of the D. X. T had prolonged median survival in both groups but in 1st group that had shown lowest median survival in 70% of cases were underwent by non-computerized machine of D. X. T that was in the our country Table (7) . While in 30% of cases were underwent by computerized machines of D. X. T table (8) those patients had prolonged – median – survival . In the 1st group where the patient that were underwent by one-burr-hole plus D. X. T " computerized " that had demonstrated prolonged median survival in 20% of cases table (7) while 80 % of cases were underwent non-computerized D. X. T

Comparative Study between two neurosurgical methods in treatment of the deep-seated malignant brain tumor

that had shown short-lived median-survival table (7) . In the 2nd group where the patients were underwent by computerized D. X. T machine that had demonstrated prolonged median survival relatively in 40% of cases while those patients who were underwent by non-computerized D. X. T machine that had shown 60% of cases were demonstrating short-lived median survival table (6) . The effect of residence of the patients in relation to the median survival in the 1st group that had shown in 40% of cases were from the middle of Iraq while 60% of cases were from the south of the Iraq table (9) . that had shown prolonged median survival of the patients from the middle of Iraq . In the 2nd group the table (10) that had demonstrated in 48% of cases were from middle of Iraq had prolonged median-survival while in 52%% of cases were from the south of Iraq they had demonstrated short-lived median-survival . table (10) .

DISCUSSION

There are three goals in surgery for malignant glioma : obtain a tissue diagnosis , decrease mass effect and decrease tumor burden . Because imaging studies can not accurately predict tumor type or grade , a tissue sample is required in essentially all cases before making treatment recommendations or providing the patient with prognostic expectations . On other hand the Svien 1949 and colleagues should that there was no significant difference in survival between grades II and III when using the kernohan system . Paul Santiago and Daniel Bergeld showed when lesion are located in surgically inaccessible regions , means deep seated lesion , when the patients are deemed medically to be too high risk for craniotomy , or when comorbidity predicts a shortened LOS , biopsy may be warranted . The use of the stercotaetic techniques to do a proper burr hole for brain biopsy from the deep-seated lesion

. This type of this technique permits the surgeon to offer these patients a tissues-diagnosis without the risk of the general anesthesia , with reasonable accuracy (despite the possibility of sampling error) . Low cost , and relatively low risk of morbidity or mortality . The use of the formal craniotomy plus the D. X. T on the second group that shown in my study decreased median survival in comparison with first group who were underwent by burr hole biopsy plus D. X. T. this can be explained probably because of biological behavior of the malignant cells of the malignant glioma . Ammirati M , Vick N, Liao Y Letal and Harsh GR 41h , Levin VA Gutin PH , et al showed in their studies that have the reoperations extends LOS length of the survival in these selected patients to a median of 36 weeks . Preoperative studies should clearly show tumor progression in a resectable location . A number of techniques have been developed to improve the safety of surgery and median survival rate of these patients who are suffering from these difficult deep seated lesions . Radian therapy , age , and performance status have been demonstrated to be the three most significant prognostic factors in the patient with malignant glioma that was said by Pan Hc , Wong II , Guo wy , Lee . The median survival was more longer in the first group than second group that was explained by using the recent computerized machines for radian therapy in which the LOS above 2 years table (6 , 7) , because of the three radiotherapy is the only factor amenable to modulation by the clinician , manipulation of total dose . fractionation , particle size & type , timing and combination therapy with chemotherapy , hyperbaric therapy , cryotherapy , and interstitial brachytherapy have been tried to improve on the standard 5400 cGy administered over 5 weeks without significant gain in length of survival " LOS " In the our study that was

demonstrated the deep-seated malignant glioma which was more common in male more than female whereas the Mao.⁽⁶⁾ Y, Desmeules m , Semenciw Rm et al in Canada 1991 . that showed calicoblastoma multiform & Anaplastic Astrocytoma & lightly more common in male than female , with a male – to – female ratio 1.6 and 1.5 respectively . The malignant astocytoma are the most common primary cerebral neoplasm in adult that was shown by study of Davis ^(3,9) F, Freels S , Grutsch et al . In this study was revealed the adults in both sexes in the age above fifth decade who were more affected by this type of neoplasm . There was wide variation of the median survival between the patient who was coming from the middle region of the IRAQ and those patients were belong to the south region of the IRAQ . Those patients were belong to first group who were treated by the burr hole biopsy & were lived in the middle region of the IRAQ , they had median survival rate more than those patient who were lived in the south of Iraq table (9 , 10) that was explained probably to the storage and use of the chemical weapons and radian emitting fro the ballistic weapon which was used during the war in the south of Iraq that chemical and radian contaminated the soil , vegetables &

meat of the animals .Correcting for differences in racial and age distribution,there appears to be little difference in rate of A. A and GBm from nation to nation that was said by cheng mk : 1982 ⁽⁸⁾ .

CONCLUSION

We feel that these results , together with other results from other neurosurgical centers should help to complete the map of How to deal with deep seated brain tumor like Astrocytoma Grad III or Grad IV . The importance of the method of burr-hole biopsy plus DX . T which is not costly , less time consuming and easier for neurosurgeon and less efforts for substaff . who are working in the theater . The use of surgical technique of burr hole plus D. X. T indicated the need for the employment of the steriostaclic Surgery , we feel , therefore , that a burr-hole plus D. X. T is to be recommended as a usual method of neurosurgery to treat the high malignant , deep seated brain tumor . This study had been demonstrated the growth rate of the deep-seated high malignant brain tumor will be increased and the patient started to suffer from high recurrent rate of that brain tumor . The survival rate or median-survival which is equal or it is more longer in the patients who were underwent by a burr hole plus D.X. R .

1st group Age	Brain burr hole + D X . T	%	Median survival
below fifth decade	10	40 %	2 – 3 years
Above fifth decade	15	60 %	18 month
Total	25		

Table (1) Median Survival is related to the Age

Comparative Study between two neurosurgical methods in treatment of the deep-seated malignant brain tumor

1st group Age	Craniotomy + D X . T	%	Median survival
Below fifth decade	12	47 %	1 year
Above fifth decade	13	52 %	6 months
Total	25		

Table (2)Median survival is related to the age .

1st Group " burr hole + D. X. T "					
Male	%	Median survival	Female	%	Median survival
20	80%	2 years	5	20%	2 years

Table (3)Median survival is related to the sex .

2nd Group " craniotomy + D. X. T "					
Male	%	Median survival	Female	%	Median survival
18	72%	9 months	7	28%	9 months

Table (4)Median survival in relation to the sex .

	No. of patient	%
Male	38	76
Female	12	24
Total	50	100

Table (5)Sex-distribution in relation to the deep seated malignant brain tumor .

2nd group " Craniotomy + D. X. T "			
Type of machine of DX.T	Patient No.	%	Median survival
Computerized	10	40 %	1 year
Non-computerized	15	60 %	9 months

Table (6)Effect of the recent type of the D. X. T on the median survival .

1st group " burr hole + DX. T "			
Type of machine of DX.T	Patient No.	%	Median survival
Computerized	5	20 %	2 years
Non-computerized	20	80 %	1 year

Table (7)Effect of the recent type of the D. X. T on the median survival

Type of machine of DX.T	Patient No.	%	Median survival
Computerized	15	30 %	2 years
Non-computerized	35	70 %	Less than one years
Total	50	100 %	

Table (8)Type of the machine in relation to the deep seated malignant brain tumor.

1st group " burr hole + D. X. T "			
Residence	No of pat.	%	Median survival
Middle of Iraq	10	40 %	2 – 7 years
South of Iraq	15	60 %	1 year
Total	25		

Table (9)The effect of the Residence of the patient in relation to the median survival

Comparative Study between two neurosurgical methods in treatment of the deep-seated malignant brain tumor

2nd group " Craniotomy + D. X. T "			
Residence	No of pat.	%	Median survival
Middle of Iraq	12	48 %	1 year
South of Iraq	13	52 %	9 month
Total	25		

Table (10)The effect of the Residence of the patients on the median survival

Age	No. of patient	%
In fifth decade	22	44 %
About fifth decade	28	56 %
Total	50	100 %

Table (11)Deep-seated brain tumor is distributed in relation to the decade of life .

REFERENCES

1. James C D, Carlbom E , Dumonski jp , et al clonol genomic alterations in glcoma malignancy stages . Concer res 48 : 5546 – 5551 , 1988 .
2. James CD , Carlbom , Nordenskjold M , et al : mitotic recombination of chromosome 17 in astrocytomas . Proc. Nat/ Acad Sci USA 86 : 2858 – 2862 , 1989 .
3. Davis F, Freels , S , Grutch J . et al survival rates in patients with primary malignant brain tumors stratified by patient age and tumor histologic type : An analysis based on surveillance, Epidemiology , and End results (SEER) data , 1973 – 1991 J Neurosurg . 88 : 1 – 10 , 1998 .
4. Cohen A , Modan B : Some epidemiologic aspects of neoplastic disease in Israeli immigrant population 3. Brain tumors cancer 22 : 1323 – 1328 , 1968 .
5. Troillas P , menaud G, De , the G , et al : (Epidemiological study of primary tumors of the neuraxis in the Rhone-Alps region Qualitative data on the etiology and geographical distribution of 1670 tumors) Neural (paris) 131 : 691 – 707 , 1975 .
6. Mao Y , Desmeules M , Semenciw RM , et al . Increasing brain cancer rates in Canada CMAJ 145 : 1583 – 1591 , 1991 .

7. Ohasgbulam SC , Saddegi N , Ikerionwus : intracranial tumors in Enugu Nigeria .
Cancer 46 : 2322 , 1980 .
8. Cheng MK : Brain tumors in the peoples Republic of China : A statistical review .
Neurosurgery 10 : 16 – 21 , 1982 .
9. Davis DL , Hoel D, Foxj , Lopez A : International trends in cancer mortality in France
, west Germany , Italy , Japan , England and Wales , and the USA (see comments)
Lancet 336 : 474 – 481 , 1990
10. Burger PC , Heinz ER , Shibata T . et al Topographic anatomy and CT correlations in
the untreated glioblastoma mulforme . J Neurosurg 68 : 698 – 704 , 1988 .
11. Scherer HJ : The forms of growth in glwmas and their practical significance Brain 63
: 1 – 35 . 1940 .
12. Scherer HJ : cerebral astroytomas and their derivatives . As J cancer 4 : 159 – 198 ,
1940 .
13. Nazzaro JM , Neuwelt EA : The role of surgery in the management of supratentorial
intermediate and high . grade astrocytomas in a dults . J Neurosurg 73 : 331 – 334 ,
1940
14. Bernstien JJ , Goldberg WJ : Rapid migraton of grafted cortical astrocytoma from
suspension gnofts placed in host thoralic spinal cord Brain Res 401 : 205 – 211 , 1989
15. Bernstein JJ , Gold berg WJ , Laws ER et al : C6 gliomes cell invasion and migration
of rat brain after neural homografiting ultrastructur Neurosourg 26 : 622 – 628 , 1990 .
16. Bernstein JJ , Laws EN Levine KV , et al C6 glcome astrocytoma cell and fetal
astrocyte migration into an artificial basement membrane : A permissive substrate for
neural tumors but not fetal astrocytes . Neurosurgeny 28 : 652 – 658 . 1991 .

المقارنة بين طريقتين جراحيتين لعلاج الأورام الدبقية العميقة المنشأ متقدمة النمو في الدماغ .

الدكتور حيدر مخلف علي (دكتوراه في الجراحة العصبية)

كلية الطب / جامعة ذي قار / مستشفى الحسين التعليمي

الملخص :

الاهداف : تهدف الدراسة الى ايقاظ جراحي الجملة العصبية حول أهمية طريقة تثقيب الجمجمة وبمساعدة العلاج بالاشعة السينية العميقة في معدل فترة العيش بعد التداخل الجراحي لمرضى اورام الدماغ الدبقية متقدمة النمو العميقة المنشأ .

الطرق : خلال فترة خمس سنوات تم جمع وتشخيص (٥٠) حالة معتمدين على مفراس الدماغ وفحص الرنين المغناطيسي للدماغ وفحص الانسجة المختبرية والتي أثبتت جميعها أورام دبقية عميقة المنشأ متقدمة النمو وقد قسمت الحالات الى مجموعتين الاولى تم علاجها بواسطة تثقيب الجمجمة مع العلاج بالاشعة السينية العميقة والمجموعة الثانية تم علاجها بواسطة فتح الجمجمة التقليدي مع استئصال جزئي كبير للورم ومن ثم علاجها بواسطة الاشعة السينية العميقة تم التداخل الجراحي في جميع الحالات في مستشفى الكاظمية التعليمي ومستشفى الموسوي الاهلي ومستشفى السعدي الاهلي في مدينة البصرة .

النتائج : لم نجد فرق واسع بين الطريقتين في معدل فترة العيش بل كانت فترة العيش أطول نسبيا للمجموعة الاولى .

الاستنتاج : ان استخدام طريقة تثقيب الجمجمة مع العلاج بالاشعة السينية يحتاج الى تكنيك خاص (Steriostatic surgery) وتعتبر طريقة تثقيب الجمجمة في علاج مثل هذه الاورام هي الافضل والتي نوصي بها خصوصا في الاورام الدبقية للدماغ العميقة المنشأ المتقدمة في النمو .