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Surgical outcome of patients with neuroblastoma: Experience from a tertiary care centre in a developing country.

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Abstract

Background: Neuroblastoma (NB) is the most common non-CNS tumour of childhood originating from the neural crest cells. The overall survival rate of patients with the disease remains suboptimal, especially for those with advanced disease. For the high risk group, the long-term survival rate is less than 40% in most studies. From the experience of many tertiary centres, complete excision of tumour correlates with better survival. We present our experience of operated NB patients.

Methods: Records of all the patients who were operated in our department from January 2014 to December 2022 were searched from the hospital medical records and reviewed retrospectively. Collected data was analyzed and results were obtained.

Results: The study included 30 patients. Male and female ratio was 1.2:1. Most common presentation was incidentally detected lesions (69%) followed by abdominal mass (25%). Most common site was retro peritoneum (56%) followed by left adrenal (37.5%) and right adrenal glands (6%). Patients were operated mostly in the age range of 1-3 years with mean age of 29.2 months. Most of the patients were having stage I and II disease, only 2 patients were diagnosed stage IV disease preoperatively. There were no major intra-operative events or post-operative complications. One patient of stage III progressed to stage IV on follow up and one patient expired among all the operated patients who had stage IV disease. Overall survival was 93.75%; event free and disease free survival was 87.5%.

Conclusion: Surgery for NB though challenging is effective mode of treating the patients with curative intent. It can safely be used even for advanced stage diseases after chemotherapy and can be accomplished quite safely in experienced hands.

Keywords: Neuroblastoma, Children, Surgical outcome, Developing countries.

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Introduction

Neuroblastoma (NB) is the most common non CNS solid organ malignancy of children. It originates from neural crest cell derivatives in the sympathetic nervous system, comprising about 8 percent of childhood malignancies but disproportionately accounting for 15% of childhood cancer deaths [1]. Although overall survival has improved, 36% of patients present with metastatic, high-risk disease that is difficult to cure [2]. Patients commonly present during 2nd half of 2nd year of life and majority are diagnosed in first 5 years. Age at presentation is an important prognostic factor with excellent outcome in children aged <18 months and increasingly worst outcome as the age goes up at presentation [3].

Neuroblastic tumours arise in the adrenal medulla or in the paraspinal sympathetic ganglia of the neck, chest, abdomen, or pelvis. The most common site of NB is abdomen where it usually presents as a painless abdominal mass. However symptoms may be due to mass effect from the primary tumour, sequelae of metastatic disease, or paraneoplastic syndromes [4]. The overall survival rate of patients with the disease remains suboptimal, especially for those with advanced disease. For the high risk group, the long-term survival rate is less than 40% in most studies. From the experience of many tertiary centres, complete excision of tumour correlate with better survival [5]. At our centre, we often operate the patients with neuroblastoma either upfront or after neo-adjuvant chemotherapy in association with pediatric medical oncologist. In this article we aim to determine the outcome of NB patients who underwent surgery.

Materials and Methods

This is a retrospective review of operated cases of NB. Records of all the patients who were operated in our department from January 2014 to December 2022 were searched from the hospital medical records. Total of 30 cases of NB were found operated during this period. Out of them, 2 had underwent exploratory laparotomy with only biopsy taken from the mass while as rest of the patients underwent total excision of the mass and only these were included in this study. Data analysis was performed using SPSS software (SPSS Inc., Chicago, IL,

USA). Fisher's exact test, Chi square test and Kaplan-SMeier survival curve were used for data analysis. Significance is set at 95% confidence interval ($p<0.05$).

Results

Demographic data is shown in Table 1. Mean age at surgical procedure was 31.25 months (3 to 78 months). Age distribution is shown in Table 2. Mean duration of follow up was 29.2 months (3 months to 6 years). All the cases were having primary disease in the abdomen with retro peritoneum being the most common site of origin followed by the adrenals with left side adrenal gland being more affected than the right side adrenal gland.

Demographics of patients	
Male: Female ratio	1.2:1
Presentation	
Incidental	69%
Abdominal mass	25%
Others	6%
Primary site	
Retro peritoneum	56%
Left adrenal	37.50%
Right adrenal	6%

Table 1. Demographic data.

Age at surgery	
Age	Proportion of patients (%)
<1 year	25
1–3 years	43.75
3-5 years	12.5
>5 years	18.75
Mean age at surgery=29.2 months	

Table 2. Age distribution of the study group.

About 2/3rd of patients presented as incidentally detected lesions whereas 1/4th of patients presented with abdominal mass and 1 patient presented as thigh pain due to metastasis to right femur bone. Male to female ratio was almost equal (1.28:1). Anaemia was present in 37.5% of patients on preoperative evaluation. Hypertension was seen in 36% of patients. Most of the operated cases had early stage disease (stage I and II; 82%), with 2 cases having stage III and 3 cases presenting as stage IV disease. One patient had intra-spinal extension. The staging was based on INSS neuroblastoma staging. Five patients received neo-adjuvant chemotherapy while as majority of patients were operated upfront after assessing the resectability based on preoperative imaging results and absence of metastasis.

Intraoperative, only one patient had infiltration of psoas muscle, while as 3/4th proportion of patients had tumours adherent to surrounding structures. However, major vessels were encased in only 1 case. We were able to perform total excision in all the patients except one patient who underwent debulking and had gross residual disease after surgery. Only one patient had significant intra operative event: renal vein injury which was managed promptly by the chief surgeon himself by repairing the rent primarily. Post operatively, only 1 patient had significant complication: Chylous ascites which was managed conservatively and settled within 10 days only.

Till now, all but one patient is surviving. One of the patients who presented with stage IV disease did not do well and relapsed even after adjuvant therapy. He expired recently after about 2 years of diagnosis. One more patient, who underwent debulking only, progressed from stage III to stage IV after surgery and is now on adjuvant chemotherapy. Overall survival is 93.75% with event free survival of about 87.5% and disease free survival being 87.5%. Stage wise survival is shown in Table 3.

Stage	**Survival**
I	100%
II	100%
III*	100%
IV	50%
Overall	93.75%
Note: *One patient with stage III disease progressed to stage IV on follow up	

Table 3. Stage wise survival.

Discussion

NB is the most common non-CNS tumour of children. It continues to be a challenge for the treating team to manage these patients properly so that the overall survival and disease free survival is best. There is a general trend of improved survival of children affected by NB. This is more seen in early stages of the disease where the survival is approaching 100%. But the survival in advanced stage disease at presentation is not so optimal. These issues are more complicated in the developing countries where the presentation is delayed and the resources are scarce. Apart from that, one of the major issues in treating the children affected by NB is the use of surgery in the treatment algorithm. While as chemotherapy constitutes to be an indispensable part of the treatment, role of surgery cannot be underestimated. Many times surgery may be the only thing needed to treat these patients.

The practice at our centre has been to firstly evaluate the children who are suspected to have NB. After the diagnosis is confirmed (usually radiologically and biochemically) we assess these patients for distant metastasis and resectability for upfront surgery. If there is no metastasis and the lesion is resectable, we take the patients for upfront surgery. This approach provides us the opportunity to tackle the disease

completely and get the whole specimen for histological examination. However, if the patient has metastasis at presentation or the lesion is not resectable, we send them to the department of medical oncology where they are subjected to image guided biopsy followed by neo-adjuvant chemotherapy. Once the patients complete their chemotherapy protocol, we take them for surgery to excise the residual disease.

Data from this study shows that the mean age at surgery was 31.25 months ranging from 3 months to 78 months while as the mean follow up was about 29 months. This is almost similar to previously published data from developing countries [5]. However data from developed countries show the age at diagnosis is about 19 months [6]. This may be because the diagnosis is usually delayed in developing countries. All the patients we operated had abdomen as the primary site of NB. This may be because of the less common proportion of NB patients presenting as extra abdominal primary lesions and the small size of our study population. Most common site of NB has been retro peritoneum followed by adrenal glands in our study. Male: Female ratio in our study was 1.28:1 which is same as previously published data [7]. Anaemia was seen in about 37% of patients which is less than published data [8].

This may be explained by the fact that some patients might have received blood transfusion before preoperative evaluation which may have decreased the number of patients who had anaemia preoperatively. Majority of patients we operated were having early stage disease which is in contrast to many published studies and the fact that the presentation is usually delayed in developing countries. This may be explained by the various factors. Firstly, it may be the selection bias as only those patients were referred for surgery that have early stage disease while as those patients who have advanced stage disease and are less likely to benefit from surgical excision were not referred to us for surgery. This is supported by the finding that only 5 patients have received neo-adjuvant chemotherapy in our study. Another factor contributing to this finding, at least partly, is the efficiency of our centre which is the only referral centre for managing such patients in the state.

All the patients were operated by faculty members of the department which eliminates the bias which might have resulted because of expertise. We did not encounter significant intra or post-operative complications apart from one renal vein injury and chylous ascites post operatively both of which were managed by the operating team only. Survival results of our study were higher than the published studies [5]. Again, it may be explained by various reasons. One is that we had higher number of early stage disease patients which skewed the survival results towards better side. Second, our centre has good expertise in managing the childhood malignancies with well-trained surgical and oncology faculty. Finally, the follow up of many patients is less than 5 years so it may be early to decide about the actual survival. Longer follow up study is needed to confirm that.

Conclusion

Surgical excision of NB is an important and indispensable part of treatment of patients suffering from this malignancy. It assumes more importance in early stage disease where upfront surgery is a very plausible option which provides an excellent chance of radical clearance of disease and allows examining the excised specimen in detail (which provides excellent advantage in equivocal and doubtful cases) and it can be accomplished safely without much surgical risk in experienced hands. Surgery is effective even in later stages of disease after it has responded to neo-adjuvant therapy. Our data is supporting this practice and we have been able to achieve excellent results in our patients with survival being 93.75%, though longer term follow up study is needed to confirm the actual 5 year survival. We conclude that the surgical excision is a very effective and safe way of treating the patients of NB with curative intent in properly selected cases.

References

1. Li J, Thompson TD, Miller JW, et al. Cancer incidence among children and adolescents in the United States, 2001–2003. Pediatrics. 2008; 121: e1470–7.
2. Cohn SL, Pearson ADJ, London WB, et al. The International Neuroblastoma Risk Group (INRG) classification system: An INRG task force report. J Clin Oncol. 2009; 27: 289–97.
3. London WB, Castleberry RP, Matthay KK, et al. Evidence for an age cut off greater than 365 days for neuroblastoma risk group stratification in the children's oncology group. J Clin Oncol. 2005; 23: 6459–65.
4. Newman EA, Abdessalam S, Aldrink JH, et al. Update on neuroblastoma. J Pediatr Surg. 2019; 54(3): 383-389.
5. Chan IHY, Wong KKY, Chan GCF, et al. Surgical outcomes of patients with neuroblastoma in a tertiary centre in Hong Kong: A 12-year experience. HK J Paediatr. 2009; 14: 186-193.
6. Hale G, Gula MJ, Blatt J. Impact of gender on the natural history of neuroblastoma. Pediatr Hematol Oncol. 1994; 11(1): 91-7.
7. Fan H, Su Y, Duan C, et al. Iron deficiency in children at the time of initial neuroblastoma diagnosis. Pediatr Investig. 2020; 4(1): 17-22.
8. Agarwala S, Mandelia A, Bakhshi S, et al. Neuroblastoma: Outcome over a 14 year period from a tertiary care referral centre in India. J Pediatr Surg 2014; 49(8): 1280-1285.

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