



STAGE 4 NEUROBLASTOMA: OUTCOME OVER A 14 YEAR PERIOD FROM AIIMS NB 96 PROTOCOL

Sandeep Agarwala

**Ankur Mandelia, Sameer Bakhshi, M Srinivas,
Minu Bajpai, BK Mohanti, S. Thulkar, Veereshwar Bhatnagar**

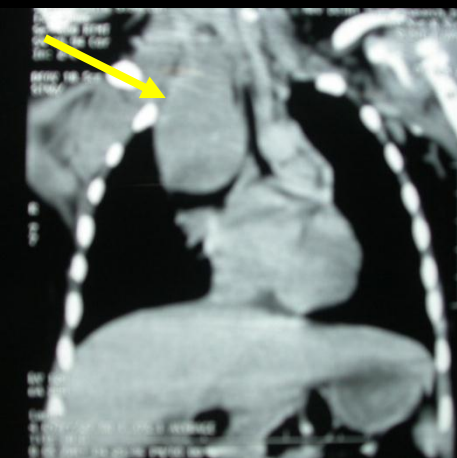
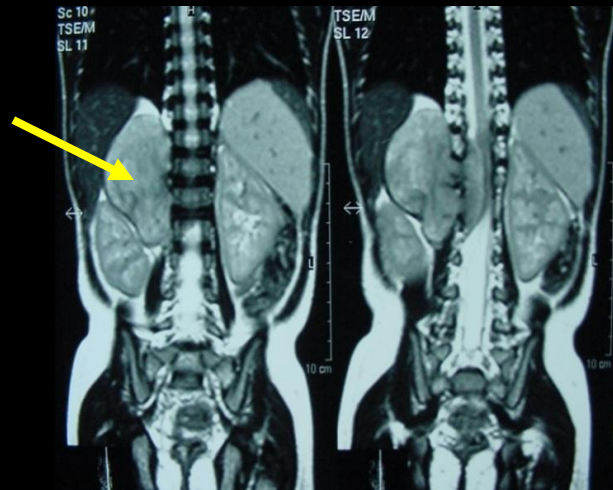
**Department of Pediatric Surgery, Medical Oncology,
Radiation Oncology and Radiodiagnosis**

All India Institute of Medical Sciences, New Delhi, India



Stage 4 Neuroblastoma

- A large proportion (48%) patients presenting to us with NB are stage 4
- Chance of cure in children older than 18 months with metastatic disease remains poor





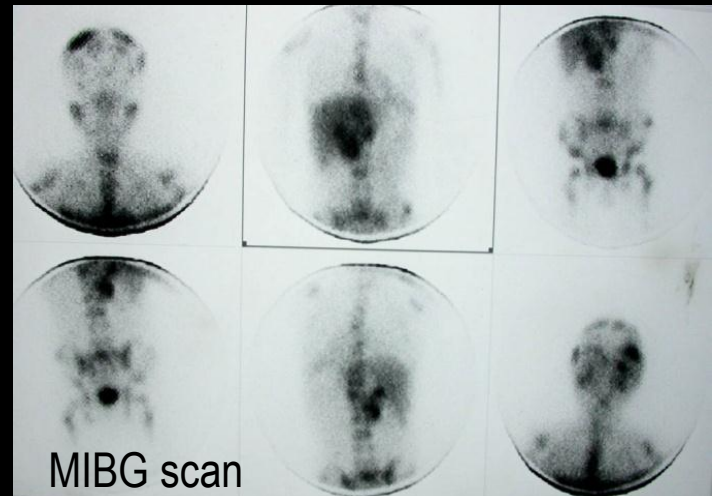
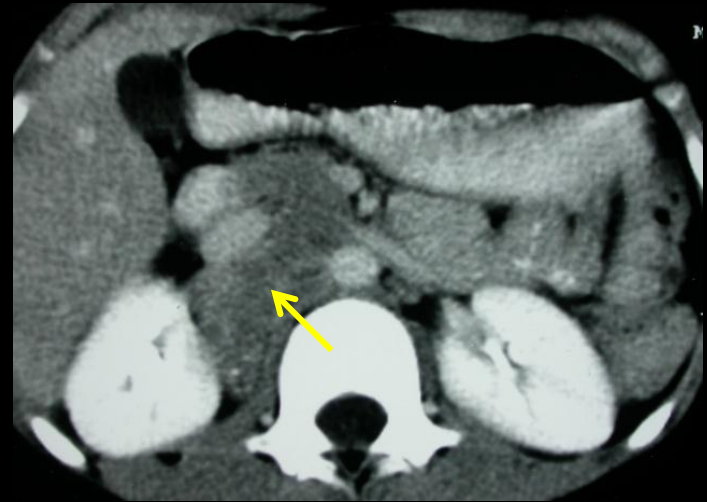
Stage 4 NB: Aims

- To evaluate the outcome of children with stage 4 neuroblastoma treated at AIIMS with AIIMS NB 96 protocol



Stage 4 NB: Methods and Materials

- *Prospective study:*
 - Oct 1996 – July 2009
 - Follow up till Dec 2010
 - Atleast 18 months
- *Inclusion*
 - All stage 4 NB patients registered in solid tumour clinic





Stage 4 NB: Methods and Materials

- *Staging*

- The International Neuroblastoma Staging System (INSS) was used for staging

- *Treatment*

- All patients received chemotherapy
 - cyclophosphamide, doxorubicin, etoposide and cisplatin
- RT to the primary site given to all abdominal and pelvic tumors



Stage 4 NB: Methods and Materials

- *Treatment*

- Surgical resection was attempted following 4-6 courses of chemotherapy only when radiological findings suggested resectability
- I^{131} MIBG therapy given for metastatic non-responsive neuroblastoma (4 cases)
- After 2004, some patients received myeloablative therapy with autologous stem cell transplantation



Stage 4 NB: Methods and Materials





Stage 4 NB: Methods and Materials

- *Patient categorization*
 - Two age groups defined: < 12 months and > 12 months
 - Primary site groups: abdominal and extra-abdominal
 - Final outcome: Disease free (DF) / Dis+ / PD / NR
- *Statistical Analysis*
 - 3-year OS calculated using Kaplan Meier survival estimate
 - log rank test of significance (P -values below 0.05 were considered statistically significant)



Stage 4 NB: Results

- Total no. of NB patients in the period: 148
- Total no. of stage 4 NB patients: 71 (48%)
- Age range: 3-137 months (median 36 months)
- Male : Female = 77:33



Stage 4 NB: Age at diagnosis



≥ 12 months: 59 (83%)

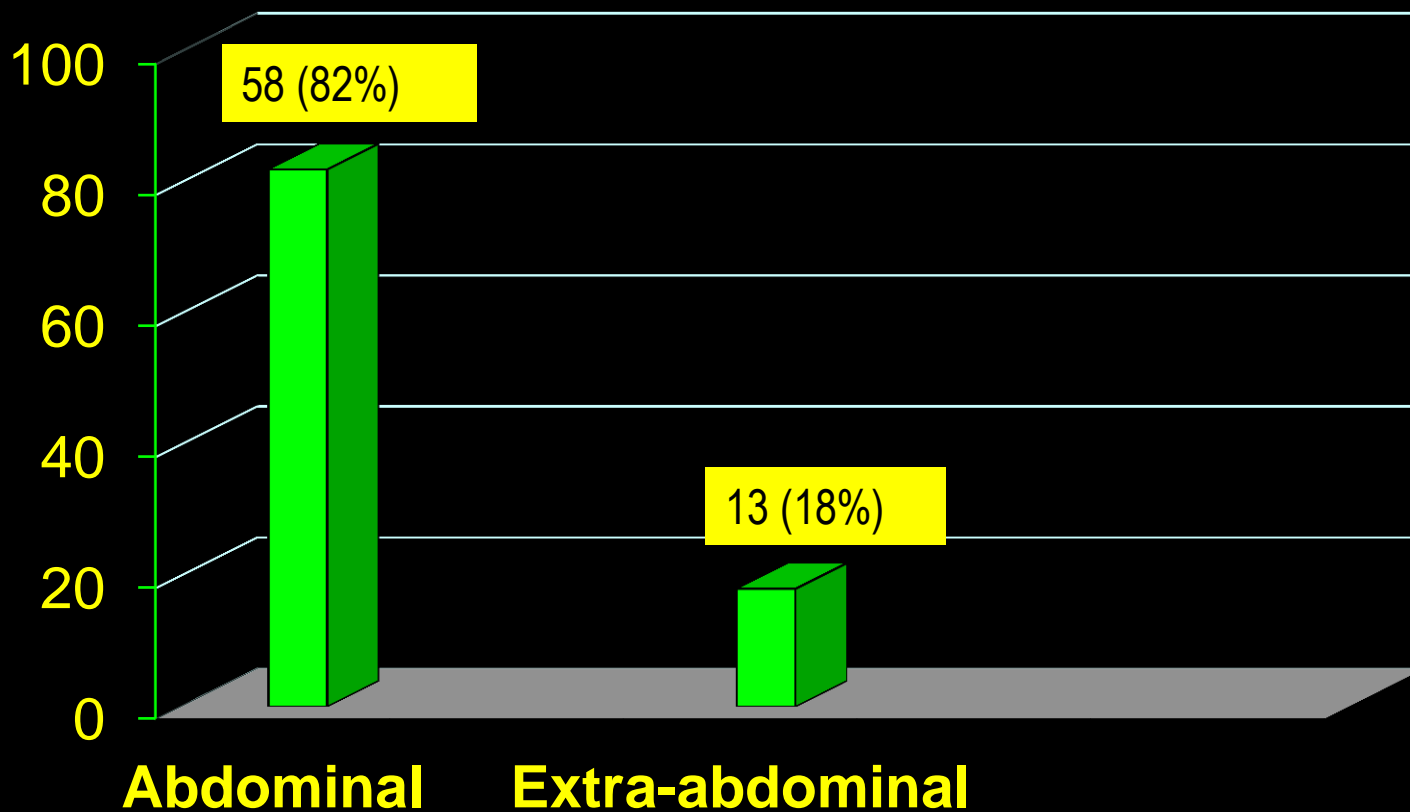
<12 months: 12 (17%)

Age of patients (n = 71)



Stage 4 NB: Primary tumor

% distribution of patients

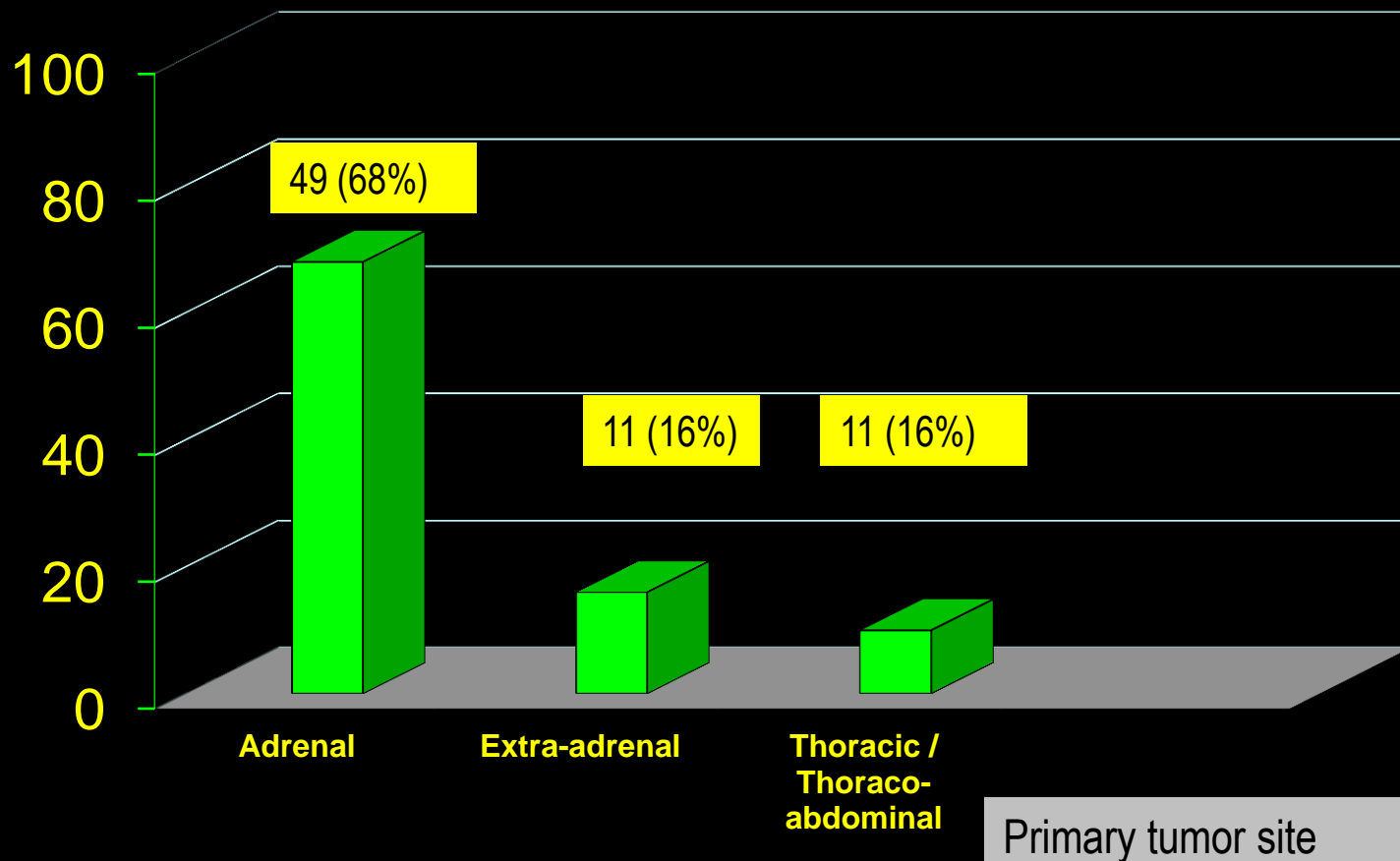


Primary site groups



Stage 4 NB: Site distribution of primary

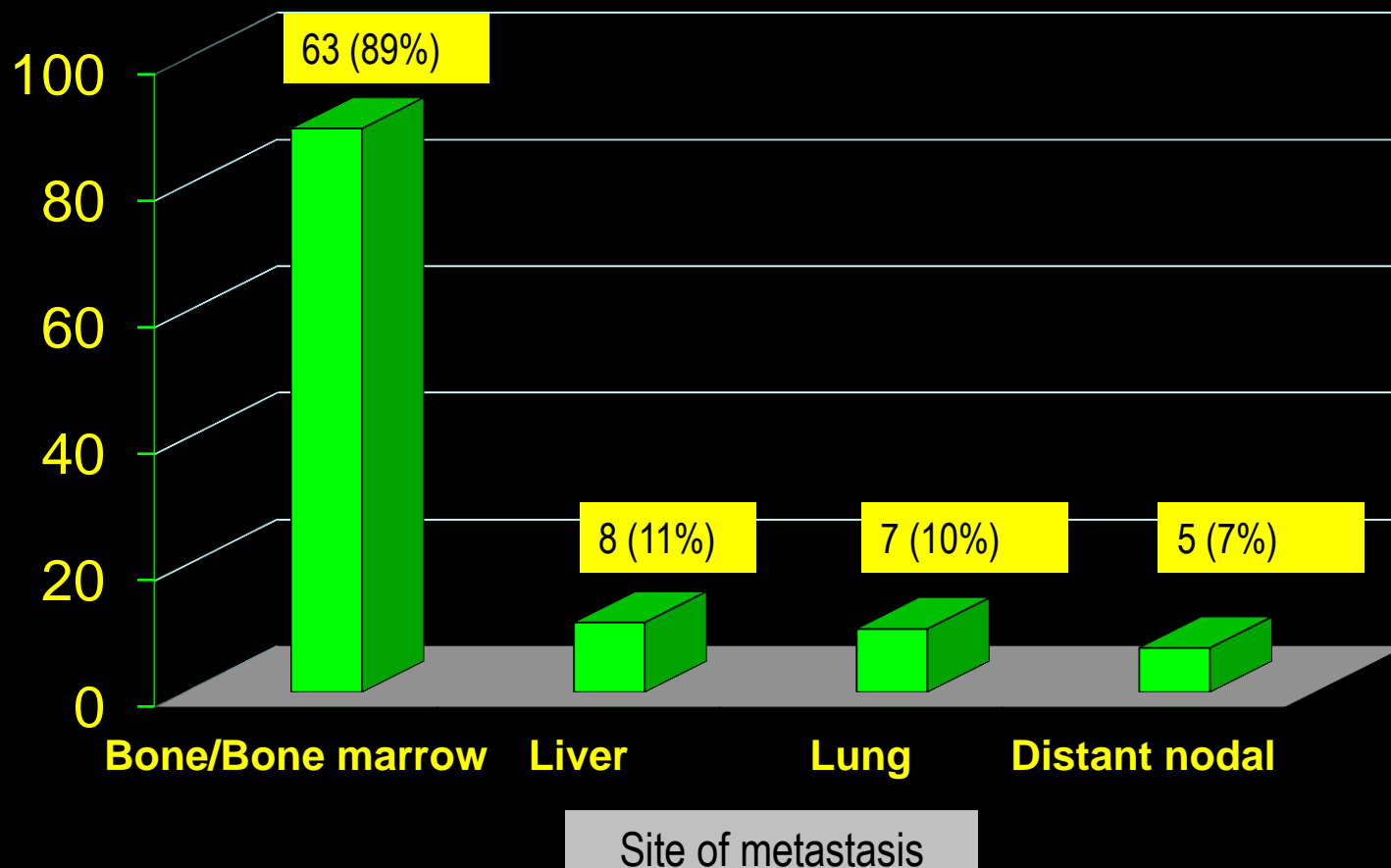
% distribution of patients





Stage 4 NB: Site of metastasis

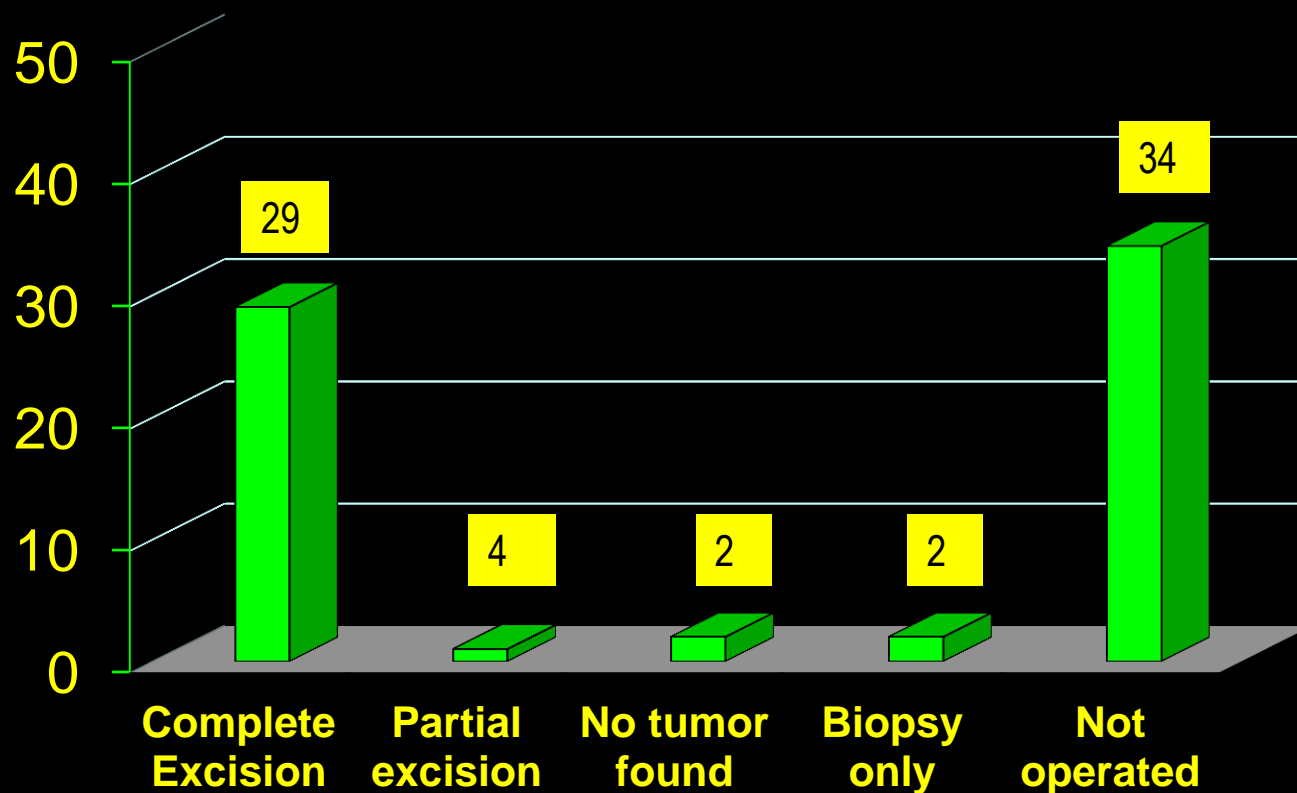
% distribution of patients





Stage 4 NB: Surgical outcome

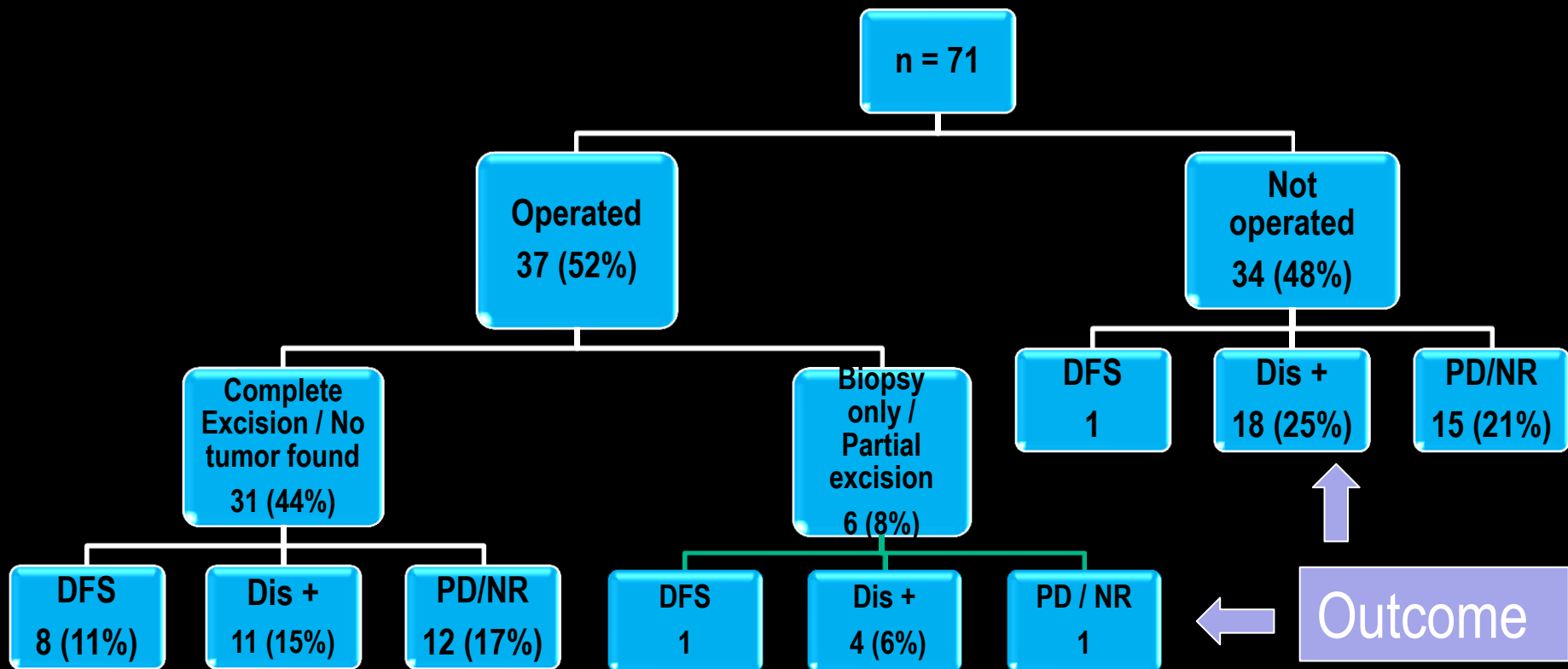
No. of patients



Total patients (n=71)



Stage 4 NB: Resection of primary



DFS = 10 (14%);

Dis + = 33 (46.5%);

PD/NR = 28 (39.4%)

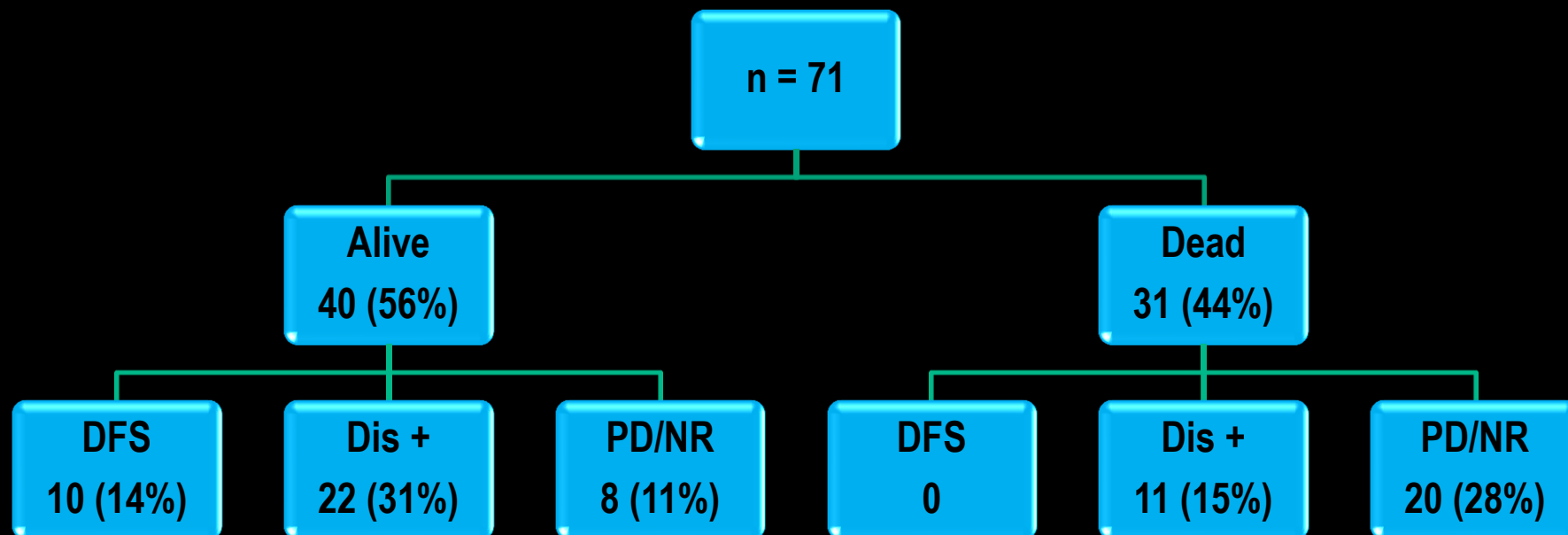


Stage 4 NB: ASCT

- Autologous Stem Cell Transplant was done for 9 patients
 - 7/9 (78%) of these relapsed
 - Only 2 achieved DF survival

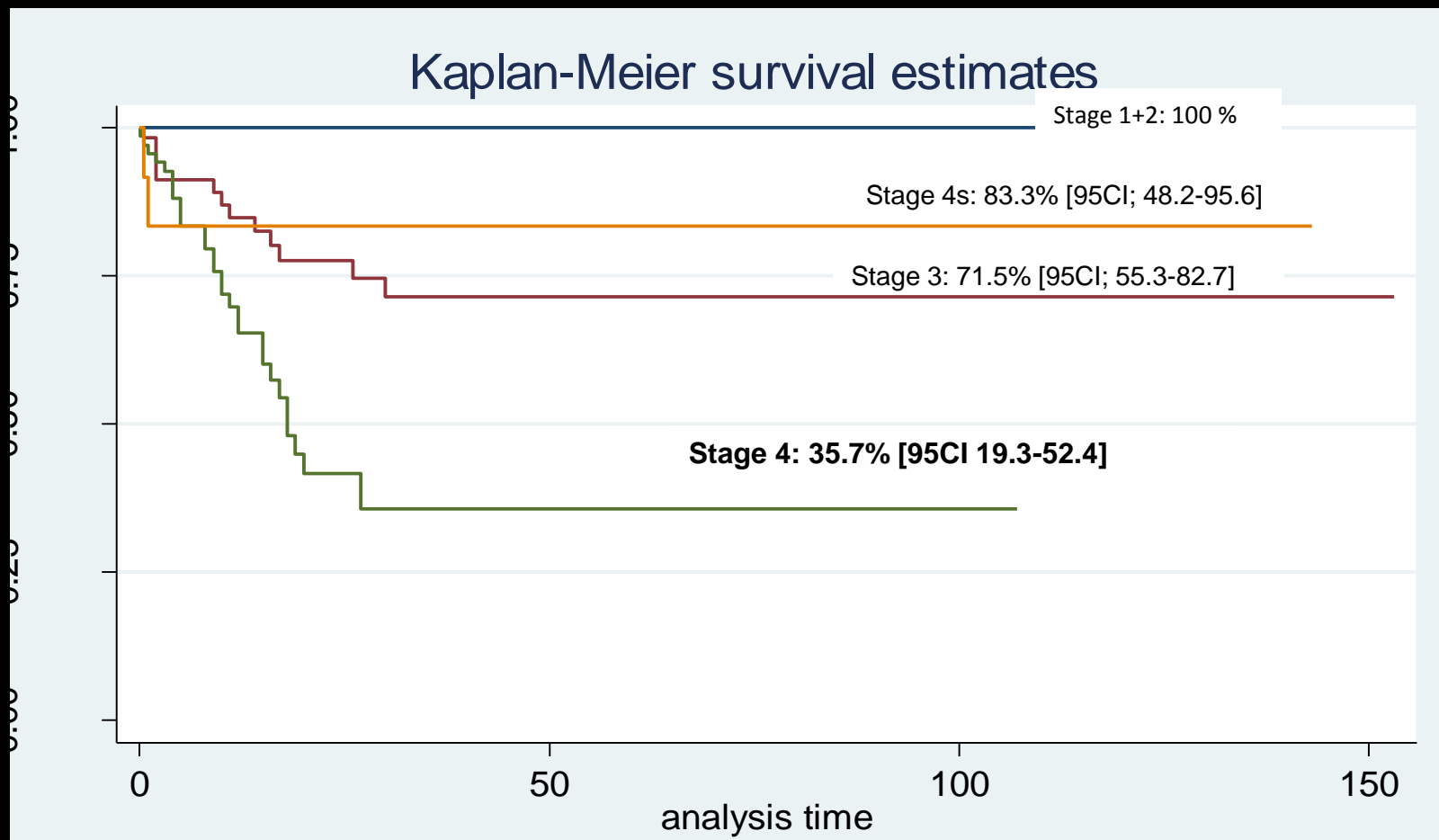


Stage 4 NB: Survival Outcome





AIIMS – NB 96 : 3-yr OS by stage



$P = 0.001$



AIIMS – NB 96 : Conclusions

- Large proportion (48%) of our NB cases are stage 4 disease at presentation
- A large number of these respond to induction chemotherapy
 - Many later develop progressive disease
- The 3 year OS is dismal 38% with only 14% achieving disease free status



Thank You