# Impact of Hemiscrotectomy on Outcome of Patients with Embryonal Paratesticular Rhabdomyosarcoma: Results from the Cooperative Soft Tissue Sarcoma Group Studies CWS-86, 91, 96 and 2002P

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**Abbreviations and Acronyms**

CWS = Cooperative Weichteilsarkom Studie (Cooperative Soft Tissue Sarcoma Study)

ES = event-free survival

IRS = International Rhabdomyosarcoma Study

OS = overall survival

PRE = primary reexcision

PTRMS = paratesticular rhabdomyosarcoma

RMS = rhabdomyosarcoma

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Trials were approved by appropriate ethical committees.

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**Purpose:** Children with paratesticular rhabdomyosarcoma have a favorable prognosis. Surgical treatment problems include inadequate primary transscrotal approaches, incomplete tumor resections and the need for secondary hemiscrotectomy. We evaluated the need for hemiscrotectomy regarding local relapse and outcome.

**Materials and Methods:** A total of 173 patients with a diagnosis of paratesticular rhabdomyosarcoma were enrolled in the Cooperative Soft Tissue Sarcoma Studies between 1986 and 2008. Of the patients 17 were excluded due to an incomplete data set and alveolar histology. Thus, a total of 156 patients with embryonal subtype were analyzed. All patients were treated according to study protocols, which included multiagent chemotherapy, tumor resection and/or radiotherapy.

**Results:** Mean ± SD 5-year overall survival rate was 91.5% ± 2.4% for patients with embryonal rhabdomyosarcoma. A total of 28 patients underwent transscrotal approaches initially. Of these patients 12 were treated with hemiscrotectomy (mean ± SD 5-year event-free survival 91.7% ± 8%) and 16 without hemiscrotectomy (93.8% ± 6.1%). Additionally 13 of 156 patients underwent an inguinal approach with hemiscrotectomy due to suspicious tumor infiltration of the scrotal skin (mean ± SD 5-year event-free survival 84.6% ± 10%). Relapse was observed in 3 of 12 patients after transscrotal approach with hemiscrotectomy (locoregional lymph node in 1 and metastasis in 2). One metastatic relapse was observed in the group undergoing a transscrotal approach without hemiscrotectomy. One of 13 patients treated with an inguinal approach and hemiscrotectomy had locoregional relapse and died of disease.

**Conclusions:** Hemiscrotectomy seems not to be mandatory in patients after transscrotal approaches regarding outcome and local relapse. Nevertheless, hemiscrotectomy probably should be performed if the scrotal skin is infiltrated.

**Key Words:** rhabdomyosarcoma, scrotum, testicular neoplasms, urogenital surgical procedures



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PARATESTICULAR rhabdomyosarcomas are found in approximately 7% of all children with rhabdomyosarcoma and account for 12% of pediatric scrotal tumors.[1,2] The tumor arises from mesenchymal tissues of the spermatic cord, epididymis, testis and testicular tunica.[1] The prognosis of patients with paratesticular rhabdomyosarcoma is usually good since the tumors are normally detected early, mostly belong to the favorable embryonal subtype, are mostly nonmetastatic at diagnosis and can often be resected completely.[3,4] Additionally cases involving paratesticular alveolar rhabdomyosarcoma have a better outcome than those involving other sites.[3] In several studies the 5-year overall survival is more than 80%.[4] Therapy consists of a multidisciplinary approach, including surgery, chemotherapy and radiation.

Surgery has a key role in the treatment of these tumors. Radical orchiectomy using an inguinal approach with high dissection of the spermatic cord is the treatment of choice.[1,2] Transscrotal procedures are sometimes performed to explore a suspicious scrotal mass. However, these approaches are considered inappropriate due to the risk of tumor cell contamination at the scrotum. Therefore, it is recommended that transscrotal procedures be avoided. If they are in fact carried out, primary reexcision with hemiscrotectomy is recommended per several treatment protocols, including CWS and the Italian Cooperative Group.[1] Additionally Rogers et al reported the indications for hemiscrotectomy in managing scrotal/paratesticular tumors as including scrotal contamination after transscrotal biopsy or tumor resection, direct scrotal tumor invasion, palpable residual disease and positive or uncertain cord or soft tissue margins.[5]

The need for hemiscrotectomy remains unclear. Most authors report performing hemiscrotectomy after transscrotal approaches due to the supposed risk of contamination, although these findings are not substantiated by large series.[1,5] We sought to analyze the necessity of hemiscrotectomy in patients with embryonal PTRMS treated within CWS.

## MATERIALS AND METHODS

### Patients

More than 3,500 patients with a histological diagnosis of RMS proved by reference review were treated at participating institutions in Germany, Austria, Poland and Switzerland, and were enrolled in CWS-86, 91 and 96, and the first 5 recruiting years of CWS-2002P of the German Society for Paediatric Oncology and Haematology, which ran from 1986 to 2008. A total of 173 patients with a diagnosis of PTRMS were identified. Nine patients were excluded due to an incomplete data set and 8 due to alveolar histology to allow better comparability due to completely different tumor biology. Therefore, 156 patients were analyzed regarding transscrotal approaches and hemiscrotectomy for tumor infiltration of the scrotal skin. All patients were treated according to study protocols, which included multiagent chemotherapy, tumor resection and/or radiation therapy. The studies were approved by the appropriate ethical committees. Written informed consent for participation in the trials was given by the patients, guardians or parents, or both.

Patients were divided into 3 groups. Group A included those undergoing a transscrotal approach without secondary hemiscrotectomy. Group B consisted of those undergoing a transscrotal approach followed by secondary hemiscrotectomy. Group C consisted of those not treated with a transscrotal approach but undergoing hemiscrotectomy due to a suspicious palpable tumor of the scrotal skin.

### Risk Stratification for Systemic Treatment

All patients with PTRMS received multiagent chemotherapy consisting of at least 3 drugs, including alkylators, dactinomycin and vincristine, depending on risk stratification and trial. The different chemotherapy regimens are outlined in the Appendix.

### Surgery

Surgical guidelines encompassed orchiectomy of the affected testis via an inguinal approach. Hemiscrotectomy was prescribed if the scrotal skin was infiltrated macroscopically by tumor. In CWS-86 reexcision was recommended after incomplete resection with positive margins.[6] Patients undergoing a transscrotal approach required reexcision of the tissue margins of the scrotal incision. In CWS-91, 96 and 2002P there were 2 options for hemiscrotectomy.[7,8] Hemiscrotectomy was planned if macroscopic tumor infiltration of the scrotal skin was present, and observation was carried out if there was no infiltration of the scrotal skin. In general, hemiscrotectomy was recommended based on the study protocol if tumors macroscopically infiltrated the scrotal skin and was suggested by the study board after transscrotal approaches.

### Assessment of Relapse

Assessment of local or metastatic relapse was performed for all patients. Local relapse was defined as relapse at the primary tumor site. Locoregional relapse was specified as tumor relapse in the inguinal or paraaortic lymph nodes. Metastatic relapse was defined as relapse in distant organs.

### Assessment of Resection Status

Tumor resections were classified as follows. Microscopically complete tumor resection was designated $R_0$, and macroscopically complete tumor resection with microscopic residuals as $R_1$ and macroscopic residuals as $R_2$.

### Statistical Analysis

This analysis is based on data as of September 2011. The 5-year overall and event-free survival rates were calculated using Kaplan-Meier estimates. For OS the time from primary diagnosis to death (therapy related or other