260 A long-term follow-up study after retro-orbital irradiation for Graves' ophthalmopathy

S. Hesselmann, U. Schafer, O. Micke, C. Palma, F. Bruns, N. Willich

University of Muenster, Muenster, Germany

Purpose: The aim of this study was to evaluate the long-term effects of radiotherapy in Graves' ophthalmopathy, particularly the influence on survival and cancer death.

Materials & Methods: From 1963 to 1978, 231 patients received bilateral orbital irradiation delivering 16 Gy in 8 fractions for a progessive Graves' orbitopathy. Median age was 49 (24–78) years. Overall survival and causes of death were evaluated with the help of registration offices, medical records, family doctors and relatives. Survival curves were calculated with the Kaplan-Meier-Method. The outcome of each patient was compared with the data of life tables regarding sex, age and follow-up. In addition, the treatment results were evaluated in living patients with a questionnaire (complete response/partial response/no change).

Results: With a median follow-up of 31 years (22–36 years), 102 patients are still alive, 123 patients have died and 6 patients were lost to follow-up. The 10 year, 20 year and 30 year survival rate was 89 %, 68 % and 49 % compared with a statistical survival rate of 92 %, 76 % and 52 %. The differences were not statistically significant (Logrank-test) Evaluation of cancer-free survival was possible in 166 cases. The 10 year, 20 year and 30 year cancer free survival rates were 98 %, 92 % and 88 % compared with 97 %, 93 % and 87 %. Treatment response was evaluable in 94 cases. A complete response was reported in 41 patients, partial response in 39 patients and no change in 14 patients.

Conclusion: In this small cohort, no significant evidence of radiation induced death was seen in patients treated with radiotherapy for Graves' orbitopathy. The long-term results seems to be sufficient. However, studies with a greater number of patients are necessary to examine this problem exactly.

261 Heterotopic ossification prophylaxis for various body sites besides the hip joint - a multi-center study

T. Olschewski, M. H. Seegenschmiedt, O. Micke, German Working Group on Benign Diseases.

[1]*Alfried Krupp Krankenhaus, Essen, Germany,* [2]*University of Münster, Münster, Germany*

Purpose: Prophylactic radiotherapy (RT) is used after total hip arthroplasty (THA), but only few studies with small sample sizes have been published about prophylactic RT in other joints besides the hip (Lo, Sem. Rad. Oncol. 9, 1999). After completion of a patterns of care study (PCS) for benign diseases (Seegenschmiedt et al., IJROBP 2000, in press), the German Radiotherapy Working Group on Benign Diseases conducted a multi-center cohort study, in which data of prophylactic RT for other joints have been collected. Herein, the results of the survey are presented.

Methods: In 1999, a PCS was conducted in all German RT institutions to assess patient accrual, number of patients, treatment sites and treatment indications for prophylactic RT in all body sites. The different RT schedules were evaluated with regard to timing (pre- or postoperative RT) and RT prescription (median / range of single and total dose). Radiological and functional outcome was assessed at > 1 year after completion of RT using established radiological and orthopedic scores which contain objective and subjective components.

Results: A total of 45 RT institutions reported clinical experience with prophylactic RT in other body sites (median: 3; range 1–32 cases per institution). Interdisciplinary cooperation was reported with surgeons (n = 10) and orthopedics (n = 17), both (n = 17) and head and neck surgeons (n = 1). 330 body sites (cases) in 272 patients were prophylactically irradiated between 1989–1999: 57 shoulder joints; 180 elbow joints; 40 knee joints; 4 mandibular joints; and 40 other sites: upper and lower arm, femur, tibia and fibula, abdominal wall and soft tissue with painful or functional disturbing HO. Most of these patients (92%) had a traumatic event prior to appearance of HO. 34 institutions applied preoperative RT and 11 institutions postoperative RT. The majority of cases were treated with a median single RT dose of 7Gy (range: 18 - 8Gy) and a median total RT dose of 7Gy (range: 5–215Gy). Clinical response to prophylactic RT was as follows: 292 (88.5%) achieved a stable or improved radiological condition; 38 (115%) developed new HO after partial or complete removal of HO. 304 (92%) cases reached functional improvement as compared to the preoperative status. No toxicity was reported, neither for preoperative nor for postoperative RT. Prophylactic RT within 24 hrs prior to or 96 hrs after removal of HO was more successful than outside this "treatment window".

Conclusion: This study comprises the largest number of cases reported for prophylactic RT in other regions besides the hip joint. Preoperative (within 24 hrs) and postoperative RT (within 96 hrs) are effective for HO prophylaxis and achieve similar radiological and functional response rates as for the hip joint after THA. Thus, RT provides an excellent treatment alternative for patients with contraindications to long-term steroids or NSAID medication. A prospective randomized study is required to assess the potential difference between pre- and postoperative RT prophylaxis.

262 Heterotopic ossification prophylaxis about the hip joint - a multi-center study

H. M. Seegenschmiedt,[1] H. B. Makoski,[2] O. Micke.[3]

[1]*Alfried Krupp Krankenhaus, Essen, Germany,* [2]*Städtische Kliniken, Duisburg, Germany,* [3]*University Hospital, Münster, Germany*

Purpose: Prophylactic radiotherapy (RT) is applied after total hip arthroplasty (Lo, Sem. Rad. Oncol. 9, 1999). After completion of a patterns of care study (PCS) for benign disorders (Seegenschmiedt et al., IJROBP 2000, in press), the German Radiotherapy Working Group on Benign Diseases has conducted a multi-center cohort study, in which all cases of prophylactic RT for other joints besides the hip have been collected. Results of this disease-specific survey are presented.

Methods: In 1999, a PCS was conducted in German RT institutions to assess patient accrual, number of patients and treatment indications for prophylactic RT about the hip. In addition, different established RT schedules were evaluated with regard to timing (pre- or post-operative RT) and dose prescription (median / range of single and total RT dose). Radiological and functional outcome was assessed at least 1 year after completion of RT using established radiological and orthopedic scores containing objective and subjective parameters.

Results: A total of 92 RT institutions reported clinical experience with prophylactic hip RT (56 community, 20 university, and 16 other institutions). 4.314 treated hips per year were collected with a median number of 36 cases (range 8 – 240 cases) per institution. Interdisciplinary cooperation included surgery (n = 67 / 73%; n = 1245 patients) and orthopedics (n = 72 / 78%; 2.791) or other disciplines (n = 6/7%; 278 patients). Surgical patients had more often traumatic events prior to appearance of HO than orthopedic patients. 51 (55%) institutions applied preoperative RT (median: 4, range: 0.5 – 24 hrs prior to surgery), while 41 (45%) institutions applied postoperative RT (median: 24 hrs; range: 1 – 94 hrs after surgery). Preoperative cases were treated with a median single RT dose of 7 Gy (range: 18 – 8Gy) and a median total RT dose of 7Gy (range: 5 – 16Gy); postoperative cases were treated with a median single RT dose of 7 Gy (range: 2 – 8Gy) and a median total RT dose of 7Gy (range: 5 – 20Gy). Prophylactic RT was applied with 13 MV cobalt (n = 13, 14%), linac accelerators (n = 82, 89%; median energy 10MV; range: 3 – 25MV) or both (n = 3). Shielding of bony structures or prostheses was not performed in 51 (55%) institutions, with standard blocks in 24 (26%) or individual blocks in 21 (23%) institutions. Prospective evaluation was reported for 3.406 cases of 25 institutions. There was no difference in response with regard to pre- or postoperative RT. Overall average radiological failure rate was 11%. Hips which were treated outside the 'treatment window' of 24 hrs prior to and up to 96 hrs after surgery had a higher failure rate.

Conclusion: This study comprises the largest number of cases reported for prophylactic RT about the hip. Pre- (within 24 hrs) and postoperative RT (within 96 hrs) are effective for HO prophylaxis and achieve similar radiological and functional response rates. RT provides an excellent treatment alternative for patients with contraindications to long-term steroids or NSAID medication.

263 The combination of preoperative irradiation with pain adapted non-steroidal-anti-inflammatory drug - therapy for prevention of heterotopic ossification following prosthetic total hip replacement. The results of a prospective study

F. Pohl,[1] K. Braun,[2] H. W. Springorum,[2] M. Flentje,[1] O. Koelbl[1]

[1]*University of Wuerzburg, Wuerzburg, Germany,* [2]*Caritas Krankenhaus Bad Mergentheim, Bad Mergentheim, Germany*

Purpose: The effectiveness of preoperative irradiation in prevention of heterotopic ossifications (HO) was shown by several studies. Most of these studies prefer an irradiation 4h before operation. This procedure can result in logistical problems. In this prospective study the combination of preoperative irradiation on the day preceding surgery with a usually given pain adapted Non-Steroidal-Antiinflammatory Drug - therapy (NSAID) was analyzed.

Material and Methods: In 1996 244 patients with normal risk factors for the development of heterotopic ossification following elective hip replacement received irradiation (single 7Gy fraction) within 16 h before operation meaning on day preceding surgery. In 92% of patients a pain adapted postoperative drug therapy with NSAID was given for 1 to 4 days. X rays of treated hips were obtained immediately and 3 months after surgery. Heterotopic ossification was scored according to the grading system of Arcq. A group of 328 patients receiving in 1993 no prophylactic radiotherapy but the same pain adapted NSAID- therapy was analyzed as historical control group.

Results: The overall incidence of heterotopic ossifications was 213% (70 pat.) for the historical control group. 9.4% (31 pat.) developed heterotopic ossification Arcq I, 7.3% (24 pat.) Arcq II and 4.6% (15 pat.) Arcq III. In the irradiated group 7.7% (19) patients developed heterotopic ossifications. In 6.1% (15 pat.) HO-grad was Arcq I, in 12% (3 pat.) Arcq II and in 0.4% (1 pat.) Arcq III. Regarding overall heterotopic ossifications there was a significant difference between the two patient groups ($p < 0.05$). Concerning Arcq classification system the results for heterotopic ossifications Arcq I, II and III were significant different between the historical control group and the irradiated group ($p < 0.05$). Especially the incidence of the clinical relevant ossifications Arcq II and III were reduced significant by irradiation.

Conclusion: The combination of prophylactic irradiation in the evening before total hip replacement with a pain adapted NSAID - therapy reduces the incidence of HO. The results of this combined therapy is comparable to those of a preoperative irradiation 4h before operation or a postoperative irradiation without NSAID - therapy.

264 Results of gamma knife radiosurgery for trigeminal neuralgia

J. H. Suh, G. H. Barnett, R. C. Crownover, J. G. Walsh, S. Y. Lee, E. W. Liu, R. M. Macklis

The Cleveland Clinic Foundation, Cleveland, OH

Purpose: To investigate the efficacy of gamma knife radiosurgery (GKRS) for trigeminal neuralgia (TN).

Materials and Methods: From January 1997 to July 1999, 95 patients with medically refractory TN (either newly diagnosed or recurrent) underwent GKRS. Fifty-five patients with minimum of 6 months follow-up who completed a phone survey were included in this analysis. The phone survey recorded the response, if any, to GKRS, status and frequency of attacks, use of medications, quality of life and use of salvage therapy, if any. To assess pain relief, the Barrow Neurologic Institute's scoring system was used (I: no pain, no medications; II: occasional pain, not requiring medications; III: some pain, adequately controlled by medications; IV: pain, not adequately controlled by medications; and V: severe pain, no pain relief). All patients were taking medications prior to GKRS.

Results: The 22 males and 33 women had a median age of 67 (range 33–93); 21 (38%) had previous invasive neurosurgical procedures; 12 (22%) had a history of multiple sclerosis (MS). The target of GKRS was the root entry zone and the most