Operative treatment and outcomes of pediatric patients with an extremity bone tumor: a secondary analysis of the PARITY trial data

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A Secondary Analysis of the PARITY Trial Data

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Background: Osteosarcoma and Ewing sarcoma are the 2 most common primary bone sarcomas, occurring predominantly in pediatric patients, with the incidence of osteosarcoma correlating with periods of peak bone-growth velocity. Although survival outcomes have plateaued over the past several decades, ongoing treatment advances have improved function, decreased infection rates, and improved other clinical outcomes in patients with bone tumors. Recently, the Prophylactic Antibiotic Regimens in Tumor Surgery (PARITY) trial addressed the serious problem of surgical site infection (SSI) and the lack of consensus regarding the appropriate prophylactic postoperative antibiotic regimen. The objective of the present secondary analysis of the PARITY trial was to characterize the modern treatment and surgical and oncologic outcomes of pediatric patients with bone tumors at 1 year postoperatively.

Methods: The PARITY trial included patients ≥12 years old with a bone tumor or soft-tissue sarcoma that was invading the femur or tibia, necessitating osseous resection and endoprosthetic reconstruction. This pediatric subanalysis of the PARITY trial data included all PARITY patients ≤18 years old. As in the main PARITY study, patients were randomized to either a 5-day or 1-day course of postoperative antibiotic prophylaxis. The primary outcome measure was the development of an SSI within 1 year, and secondary outcomes included antibiotic-related adverse events, unplanned additional operations, local recurrence, metastasis, and death.

Results: A total of 151 patients were included. An adjudicated SSI occurred in 27 patients (17.9%). There was no difference in the rate of any SSI between the 5-day and 1-day antibiotic groups (hazard ratio [HR], 0.92; 95% confidence interval [CI], 0.4 to 1.9; p = 0.82). Antibiotic-related complications occurred in 13 patients (8.6%), with no difference noted between groups (HR, 0.46; 95% CI, 0.2 to 1.4; p = 0.18). A total of 45 patients (29.8%) required a return to the operating room within the first postoperative year, which corresponded with a 68.8% reoperation-free rate of survival at 1 year when accounting for competing risks. The most common reason for reoperation was infection (29 of 45; 64.4%). A total of 7 patients (4.6%) required subsequent amputation of the operative extremity, and an additional 6 patients (4.0%) required implant revision within 12 months. A total of 36 patients (23.8%) developed metastases, and 6 patients (4.0%) developed a local recurrence during the first postoperative year. A total of 11 patients (7.3%) died during the study period. There were no significant differences in oncologic outcomes between the 5-day and 1-day antibiotic groups (HR, 0.97; 95% CI, 0.5-1.8; p = 0.92).

Conclusions: There were no significant differences in surgical or oncologic outcomes between pediatric patients who underwent a 1-day versus 5-day antibiotic regimen following endoprosthetic reconstruction in the PARITY trial. Surgeons should be aware of and counsel patients and caregivers regarding the 30% rate of reoperation and the risks of infection (17.9%), death (7.3%), amputation (4.6%), and implant revision (4%) within the first postoperative year.

Level of Evidence: Therapeutic Level III. See Instructions for Authors for a complete description of levels of evidence.

Osteosarcoma and Ewing sarcoma are the 2 most common primary bone sarcomas. These sarcomas occur predominantly but not exclusively in pediatric patients, with the incidence of osteosarcoma correlating with periods of peak bone-growth velocity[1,2]. Other malignant bone tumors include chondrosarcoma and undifferentiated pleomorphic

*A list of the PARITY Investigators is included in the Acknowledgements of the supplement.

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sarcoma of bone, although these are more common in adult patients[3]. Treatment paradigms for patients with primary bone sarcomas evolved substantially in the late 1900s, and the standard of care now involves systemic therapy and local control with negative-margin surgical resection for osteosarcoma and Ewing[4-6] sarcoma or surgical resection alone for chondrosarcoma[7]. Limb salvage surgery is appropriate and possible in 80% to 90% of cases[8,9]. Unlike in skeletally mature patients, reconstruction in the pediatric population must account for any remaining growth of the contralateral limb to avoid limb-length discrepancies[10,11]. Numerous reconstruction options exist that can maintain or restore bone stock in the pediatric population. Although growing prostheses and distraction osteogenesis can accommodate for remaining growth, they are also associated with high rates of reoperation and infection[8,12,13]. The use of allograft bone with or without the Capanna technique involving a vascularized fibular graft can restore bone, but is associated with longer operative times and risks of nonunion, fracture, and reoperation[14,15]. Although the procedure does not maintain or restore bone stock, endoprosthetic reconstruction allows immediate weight-bearing, rapid restoration of function, and satisfactory patient-reported outcomes[16,17].

Although survival outcomes have plateaued over the past several decades, ongoing treatment advances have improved function, decreased infection rates, and improved other clinical outcomes in patients with bone tumors[11,18]. Recently, the Prophylactic Antibiotic Regimens in Tumor Surgery (PARITY) trial addressed the serious problem of surgical site infection (SSI) and the lack of consensus regarding the appropriate prophylactic postoperative antibiotic regimen[19]. The PARITY trial included data on 604 patients ≥12 years old who underwent endoprosthetic reconstruction for a bone tumor or sarcoma at 1 of 48 international sites between 2013 and 2019. Patients underwent an antibiotic prophylactic regimen of either 1 or 5 days, and the minimum follow-up was 1 year[20]. Because data were collected from international representative sites over the past decade, the PARITY trial data represent a modern, unbiased, and internationally generalizable overview of the treatment and outcomes of pediatric patients with bone tumors.

The objective of the present secondary analysis was to characterize the modern treatment and outcomes of bone tumors in a pediatric population, with regard to the initial treatment, antibiotic prophylaxis, risk of reoperation, risk of infection and other complications, and disease-free status at 1 year.

Materials and Methods

Study Design

The PARITY trial was an international, randomized clinical superiority trial comparing the effect of a 1-day versus 5-day postoperative course of an intravenous cephalosporin antibiotic, either cefazolin or cefuroxime, on the risk of SSI[20]. Pediatric patients received a dose of 100 mg/kg/day of cefazolin, with a maximum of 2 g administered every 8 hours, or 50 mg/kg/day of cefuroxime, with a maximum of 1.5 g administered every 8 hours[20,21]. The primary outcome was any SSI, and secondary outcomes included antibiotic-related complications, need for reoperation, oncologic outcomes, and functional outcomes. Patients, surgeons, outcome assessors, and data analysts were blinded to treatment allocation. Patients were followed for 12 months postoperatively. The detailed methods of the PARITY trial have been previously published[21].

Patients

The PARITY trial included patients ≥12 years old with a bone tumor or soft-tissue sarcoma that was invading the femur or tibia, necessitating osseous resection and endoprosthetic reconstruction. This pediatric subanalysis of the PARITY trial data included all PARITY patients ≤18 years old.

Outcomes Measures

As in the main PARITY study, the primary composite outcome measure was the development of an SSI within 1 year, and secondary outcomes included antibiotic-related adverse events, unplanned additional operations, local recurrence, metastasis, and death[20]. Patients were assessed for these outcomes at 2 and 6 weeks and at 3, 6, 9, and 12 months postoperatively. All outcomes were adjudicated by the blinded Central Adjudication Committee[21,22].

Statistical Analysis

Demographic data and outcomes were summarized with use of descriptive statistics. Groups were compared with use of unpaired t tests or chi-square tests, with an alpha of 0.05 and application of a Bonferroni correction for multiple testing. We utilized time-to-event analyses with the Cox proportional hazards model for the outcomes of infection, unplanned reoperation, local recurrence, metastasis, and death. Patients who did not experience the event were censored at their final study visit or at 12 months postoperatively. We examined the Schoenfeld residuals to test the Cox proportional hazards assumption. Results were presented as hazard ratios (HRs) for time-to-event outcomes and as mean differences for continuous outcomes, with corresponding 95% confidence intervals (CIs) and associated 2-sided p values. All statistical analyses were performed with use of R (version 3.3.0; R Foundation for Statistical Computing)[23].

Results

Study Patients

A total of 151 patients from 12 to 18 years old were included, with a mean patient age of 15.9 years (standard deviation [SD], 1.9 years) (Table I). A total of 94.7% of the patients had a biopsy-proven diagnosis of high-grade osteosarcoma or Ewing sarcoma. No patient in this study had a prior medical history of diabetes, lupus, another rheumatological disease, human immunodeficiency virus, renal disease, or liver disease. Genetic abnormalities were not assessed. Three patients (2%) reported a smoking history. Regarding protocol adherence, 89.4% of pediatric patients in the 5-day

TABLE I Baseline Characteristics of the Study Population*

	Total (N = 151)	5-Day Regimen (N = 66)	1-Day Regimen (N = 85)
Patient and operative characteristics			
Age, mean (SD) *(yr)*	15.9 (1.9)	15.9 (2.1)	15.9 (1.8)
Sex			
Male	98 (64.9%)	50 (75.8%)	48 (56.5%)
Female	53 (35.1%)	16 (24.2%)	37 (43.5%)
Location of tumor			
Femur	118 (78.1%)	48 (72.7%)	70 (82.4%)
Tibia	33 (21.9%)	18 (27.3%)	15 (17.6%)
Type of tumor			
Osteosarcoma	121 (80.1%)	54 (81.8%)	67 (78.8%)
Osteoblastic	91	40	51
Chondroblastic	15	6	9
Periosteal	3	0	3
Sclerosing	3	1	2
Telangiectatic	3	3	0
Unknown	6	4	2
Ewing sarcoma	22 (14.6%)	10 (15.1%)	12 (14.1%)
GCT of bone	3	1	2
Chondrosarcoma	1	1	0
UPS of bone	1	0	1
Other	3	0	3
Systemic metastases at presentation			
No	134 (88.7%)	61 (92.4%)	73 (85.9%)
Yes	17 (11.3%)	5 (7.6%)	12 (14.1%)
Preoperative systemic treatment			
Yes	131 (86.8%)	55 (83.3%)	76 (89.4%)
Preop. chemotherapy	130	55	75
Preop radiation	0	0	0
Zoledronic acid	1	0	1
No	20 (13.2%)	11 (16.7%)	9 (10.6%)
Operative characteristics			
Operative time, mean (SD) *(hr)*	4.9 (2.2)	4.7 (2.3)	5.0 (2.1)
Volume of muscle resection			
None	7 (4.6%)	3 (4.5%)	4 (4.7%)
<50 cm^3	85 (56.3%)	36 (54.5%)	49 (57.6%)
50-100 cm^3	46 (30.5%)	21 (31.8%)	25 (29.4%)
>100 cm^3	13 (8.6%)	6 (9.1%)	7 (8.2%)
Antibiotic or silver-coated prosthesis			
No	145 (96.0%)	64 (97.0%)	81 (95.3%)
Yes	6 (4.0%)	2 (3.0%)	4 (4.7%)
Antibiotic	3	0	3
Silver	3	2	1
Antibiotic powder used locally in wound			
No	103 (68.2%)	45 (68.2%)	58 (68.2%)
Yes	48 (31.8%)	21 (31.8%)	27 (31.8%)
Suction drain(s) used			
No	29 (19.2%)	15 (22.7%)	14 (16.5%)
Yes	122 (80.8%)	51 (77.3%)	71 (83.5%)
Duration of drain use, mean (range) *(d)*	4.0 (1-13)	3.4 (1-10)	4.3 (2-13)

*Values are given as the count with or without the percentage in parentheses, unless otherwise noted. There were no significant differences between groups.
GCT = giant cell tumor, UPS = undifferentiated pleomorphic sarcoma.

antibiotic group and 82.4% of patients in the 1-day antibiotic group missed no more than 3 doses.

Systemic Therapy

Of the 121 patients with osteosarcoma, 106 (87.6%) underwent neoadjuvant chemotherapy. Protocols were not standardized between sites but commonly included high-dose methotrexate with leucovorin rescue, doxorubicin, cisplatin, and possibly ifosfamide[24,25], given in cycles lasting 2 to 4 weeks. A total of 35% of the patients received 2 cycles preoperatively, and another 46% received 3, 4, or 5 cycles (range, 1 to 8 cycles). Twenty (90.9%) of 22 patients with Ewing sarcoma underwent neoadjuvant chemotherapy. Overall, 20% of patients underwent 4 neoadjuvant chemotherapy cycles and 30% underwent 6 cycles. No patient in this study received radiation therapy in the neoadjuvant or adjuvant setting. One patient with giant cell tumor of bone received preoperative bisphosphonate therapy in the form of zoledronic acid.

Surgical Outcomes

Following surgical resection, all 151 patients underwent endoprosthetic reconstruction, as allograft-prosthesis composite reconstructions were excluded from the PARITY trial. No expandable endoprostheses were utilized. An adjudicated SSI occurred in 27 patients (17.9%). There was no difference in the rate of any SSI in the 1-day compared with the 5-day antibiotic groups (HR, 0.92; 95% CI, 0.4 to 1.9; p = 0.82) (Table II). Antibiotic-related complications occurred in 13 patients (8.6%), with no difference noted between groups (HR, 0.46; 95% CI, 0.2 to 1.4; p = 0.18). A total of 45 patients (29.8%) required a return to the operating room within the first postoperative year, which corresponds with 68.8% reoperation-free survival at 1 year when accounting for competing risks (Fig. 1). The most common reason for reoperation was infection (29 of 45; 64.4%). The SSI rate among pediatric patients (17.9%) was higher than that among adult patients in the

TABLE II Study Outcomes*

Outcome	Total (N = 151)	5-Day Regimen (N = 66)	1-Day Regimen (N = 85)	HR (95% CI)	P Value
SSI	27 (17.9%)	12 (18.2%)	15 (17.6%)	0.92 (0.4-1.9)	0.82
Superficial incision	8	6	2	NR	
Deep incision	4	1	3	NR	
Organ-space	15	5	10	1.46 (0.5-4.3)	0.49
Antibiotic-related complication	13 (8.6%)	8 (12.1%)	5 (5.9%)	0.46 (0.2-1.4)	0.18
Clostridium difficile diarrhea	6	4	2	NR	
Non-*C. difficile* diarrhea	2	1	1	NR	
Opportunistic fungal	0	0	0	NR	
Other	5	3	2	NR	
Unplanned reoperation	45 (29.8%)	21 (31.8%)	24 (28.2%)	0.81 (0.5-1.4)	0.48
Irrigation and debridement	29	14	15	0.78 (0.4-1.6)	0.49
Amputation	7	2	5	NR	
Implant revision	6	4	2	NR	
Flap	3	1	2	NR	
Repeat resection	0	0	0	NR	
Oncologic margin					
R0	147 (97.4%)	66 (100%)	81 (95.3%)		
R1	4 (2.6%)	0	4 (4.7%)		
R2	0	0	0		
Any oncologic event	38 (25.2%)	17 (25.8%)	21 (24.7%)	0.97 (0.5-1.8)	0.92
Local recurrence	6	0	6	NR	
Distant metastasis	36	17	19	NR	
Other	0	0	0	NR	
All-cause mortality	11 (7.3%)	5 (7.6%)	6 (7.1%)	0.94 (0.3-3.1)	0.92
Death from disease	6	3	3	NR	
Pneumonia	3	2	1	NR	
Sepsis	2	0	2	NR	

*Values are given as the number of patients with or without the percentage in parentheses. NR = not reported (i.e., study end point did not meet the threshold defined in the Statistical Analysis Plan for the minimum number of events required to conduct a statistical comparison), R0 = negative margin, R1 = microscopically positive margin, R2 = grossly positive margin.

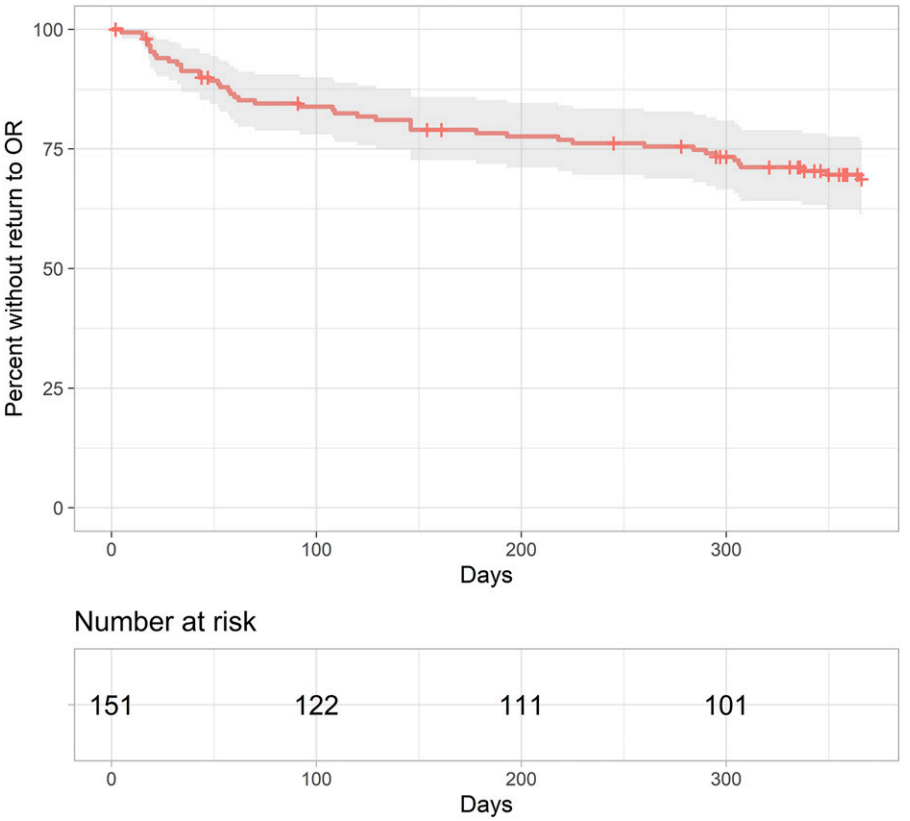

Fig. 1
Kaplan-Meier estimate of reoperation-free survival. The shading indicates the 95% CI. OR = operating room.

PARITY trial (69 of 453; 15.2%), but the difference was not significant on chi-square testing (p = 0.44).

The proportion of patients receiving local topical antibiotic powder within the surgical wound was equal between the randomized groups (31.8%). Topical antibiotic was utilized in all cases except 2, with 1 patient in each group receiving topical gentamycin. We noted the incidence of SSI in patients receiving local antibiotic powder to be 6 (12.5%) of 48 compared with 21 (20.4%) of 103 patients who did not receive local antibiotic powder. With regard to organ-space (i.e., deep) SSIs specifically, postoperative infections were observed in 1 (2.1%) of the 48 patients who received local antibiotic powder compared with 14 (13.6%) of the 103 patients who did not receive local antibiotic powder. However, post-hoc Cox proportional hazard modeling incorporating the length of antibiotic therapy, use of local antibiotics, and operative time demonstrated that only longer operative time was associated with a heightened risk of SSI (Table III). Patients who received local topical antibiotic powder did not display a higher rate of antibiotic-related complications.

A total of 7 patients (4.6%) required subsequent amputation of the operative extremity, including 4 above-the-knee amputations, 1 through-the-knee amputation, and 2 hip disarticulations. There was an associated infection in 4 patients who underwent amputation, and a local recurrence in the remaining 3 patients. An additional 6 patients (4.0%) required implant revision within 12 months. Suction drains were utilized in 122 (80.8%) of 151 patients, for an average of 4.0 days (range, 1 to 13 days). Wound vacuum-assisted closure therapy was employed postoperatively in 14 (9.3%) of 151 patients, for an average of 6.3 days (range, 3 to 17 days). Bone grafting was performed in 9 (6.0%) of 151 patients at the time of primary resection, and none of those patients subsequently developed an infection.

Oncologic Outcomes

A total of 38 patients (25.2%) experienced an oncologic event in the first postoperative year (Table II). This entailed development of metastases alone in 32 (84.2%) of these 38 patients, combined local recurrence and metastatic disease in 4 patients (10.5%), and local recurrence alone in 2 patients (5.3%). The 1-year survival rate free from any oncologic event was 73.9% (95% CI, 67.0% to 81.5%). There were no significant differences in oncologic outcomes between the 5-day and 1-day antibiotic groups (HR, 0.97; 95%, CI 0.5-1.8; p = 0.92).

All 6 patients (4%) who developed local recurrence alone or in combination with metastatic disease during the first postoperative year had negative margins (R0) for their initial resection. Of these patients, 3 had tumor necrosis of <90%, 2 had necrosis of exactly 90%, and 1 had tumor necrosis of 98%. Of the 4 patients (2.6%) with microscopically positive (R1) margins, 1 developed an organ-space infection leading to an amputation 3 months after the initial resection and

TABLE III Post-Hoc Cox Proportional Hazards Model

Characteristic	Value	All SSIs		Deep SSIs	
		HR (95% CI)	P Value	HR (95% CI)	P Value
Duration of antibiotic therapy	1 day	0.87 (0.41-1.6)	0.72	1.35 (0.46-3.9)	0.58
	5 days	Reference		Reference	
Local antibiotic powder	Yes	0.87 (0.33-2.3)	0.77	0.22 (0.03-1.8)	0.15
	No	Reference		Reference	
Operative time, per hr		1.20 (1.03-1.39)	0.02*	1.20 (0.99-1.4)	0.06

*Significant.

1 developed a distant metastasis. None developed local recurrence within the first postoperative year. No patients in this trial had grossly positive (R2) margins.

A total of 11 patients (7.3%) died during the study period, with the primary cause of death being disease progression including distant metastases in 6 and being pneumonia or sepsis in 5 (Kaplan-Meier 1-year survival estimate of 92.4%; 95% CI, 88.2% to 96.8%). Only 2 (18.2%) of the 11 patients who died had presented initially with metastatic disease. The majority of patients who presented with metastatic disease were alive at 1 year (15 of 17 patients; 88.2%).

Discussion

The present subanalysis of the PARITY trial provides modern data regarding the care and outcomes of pediatric patients in an international cohort during the first year following surgical resection of an extremity bone tumor. The length of postoperative antibiotic prophylaxis did not significantly affect surgical or oncologic outcomes.

This study showed that up to 30% of pediatric patients who undergo endoprosthetic reconstruction for extremity bone tumors can expect a reoperation within the first postoperative year, in line with a recent systematic review that suggested an overall revision rate of 31% for lower-extremity metallic endoprostheses[26]. Patients and caregivers should be counseled regarding the risk of reoperation, as well as regarding the risks of infection (17.9%), death (7.3%), and subsequent need for amputation (4.6%) or implant revision (4%), which occurred at nontrivial rates.

The EURAMOS-1 cohort study provided oncologic outcome data for >2,000 patients with osteosarcoma[27], showing 3-year event-free survival of 59%, which is in line with the 1-year survival free of oncologic events in the present study (74%)[27]. The EURAMOS-1 study did not provide information regarding the reoperation risk or reoperation-free survival rates, and thus the present findings add to the literature on important outcomes for pediatric patients with osteosarcoma. Additionally, 19% of patients in the PARITY trial had either soft-tissue sarcoma or metastatic bone disease, not bone tumors, and 75% of patients were ≥18 years old[20]. As most patients with bone sarcomas are pediatric[28], the surgical and oncologic outcomes reported in the present article are more specific for this population than those of the PARITY or EURAMOS-1 studies.

Our post-hoc analysis of overall SSI and deep infection rates demonstrated favorable outcomes for patients who received a local topical antibiotic powder (12.5% SSI; 2.1% deep infection) compared with those who did not (20.4% SSI; 13.6% deep infection), although this difference was not significant when controlling for operative time. A 2021 trial that included 980 patients with high-risk tibial fractures showed a 3.4% absolute reduction in the risk of deep periprosthetic joint infection with the use of topical vancomycin powder[29]. In the spine literature, comparative studies have supported the benefit of vancomycin powder to reduce the rate of deep infection, although a randomized trial on this topic did not demonstrate a benefit[30,31] and other single-center studies have noted increased C-reactive protein with use of vancomycin powder, as well as a correlation with culture-negative seromas[32,33]. Our findings do not clearly support the use of local antibiotic powder to lower the risk of infection in primary resections, although we noted no evidence of increased antibiotic-related complications with its use.

The approach to decreasing the risk of infection is multifaceted and can involve multiple factors that include the interval since the last chemotherapy administration[34], the preoperative white blood-cell count[35,36], patient nutritional status[37], and perioperative steps such as draping, the use of antibiotic cement[38], silver or iodine-coated prostheses[39], intravenous antibiotic prophylaxis[40], and local topical antibiotic powder. The 2018 International Consensus Meeting on Musculoskeletal Infection in Orthopedic Oncology concluded that silver or iodine-coated implants should be utilized when possible, but noted that there was no clear evidence to support the use of local antibiotic powder[41]. Outcome data regarding the use of coated prostheses vary in the literature and internationally, but only 6 (4%) of 151 of patients in the PARITY trial received a coated prosthesis, and thus our study was not powered to assess its effect on the rate of SSI.

A total of 17 patients had metastatic disease at the time of presentation, including 15 (12.4%) of the 121 patients with osteosarcoma. This proportion of osteosarcoma patients with metastatic disease is similar to those reported in prior literature,

including a study from the Cooperative Oncology Group (1,702 patients, 12.4%)[42] and an analysis of the SEER (Surveillance, Epidemiology, and End Results) database (2,017 patients, 23.0%)[43].

In the present study, a subset of patients with Ewing sarcoma (2 of 22; 9.1%) and osteosarcoma (15 of 121; 12.4%) received no neoadjuvant chemotherapy. Although such literature is uncommon, there is literature to support the use of adjuvant chemotherapy alone for the treatment of osteosarcoma. In a 2003 trial, there was no difference in the 5-year rate of survival for patients with osteosarcoma who are undergoing neoadjuvant chemotherapy (61%) compared with adjuvant chemotherapy alone (69%) ($p = 0.8$)[44]. In the present study, no regional pattern was observed regarding the choice of delivering all chemotherapy in the adjuvant setting.

Strengths and Limitations

Strengths of the present subanalysis include independent and blinded adjudication of the primary and secondary study outcomes. In addition, the generalizability of our findings is bolstered by the fact that pediatric patients were recruited from 30 sites across 7 countries. No pediatric patients were lost to follow-up. These results reflect modern treatment paradigms of extremity bone tumors and sarcomas. Limitations include potential variations in definitions and diagnosis of SSI across the included sites; however, an independent adjudication process was utilized to maintain consistency in definitions. Because patients were not followed beyond 1 year postoperatively, the effect of the antibiotic regimens on the incidence of late infection was not studied; notably, however, the updated Centers for Disease Control and Prevention definition of SSI after implantation of a prosthesis only extends to 90 days postoperatively[45]. Some factors known to be related to the risk of infection, such as obesity and blood transfusion, were not captured in the PARITY trial and may represent residual confounding[46]. Furthermore, both operative outcomes such as revision and oncologic outcomes such as distant metastases can occur well after 1 year postoperatively, but our results were limited to the length of our study period. Finally, although we did not find significant differences in the rates of SSI between patients undergoing 1-day versus 5-day postoperative antibiotic regimens, it is possible that a significant difference would have been revealed if a larger number of patients had been enrolled. However, this trial was a large, international, and multiyear effort involving numerous international sites, and the accrual of additional patients to further delineate whether a significant difference might be uncovered would have been challenging.

Conclusions

There were no significant differences in surgical or oncologic outcomes between pediatric patients who underwent a 5-day versus 1-day antibiotic regimen following endoprosthetic reconstruction in the PARITY trial. Surgeons should be aware of and counsel patients and caregivers regarding the 30% rate of reoperation and the risks of infection (17.9%), death (7.3%), amputation (4.6%), and implant revision (4%) within the first postoperative year. ■

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