

How does POSNA prefer to manage Salter Harris II fractures of the Distal Femur - A survey of the POSNA Membership

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Background

- **Salter-Harris (SH) II fractures** are by far the most common (57-61%) type of pediatric distal femoral physeal fractures.
- Appropriate treatment of these fractures is crucial due to the **risks** of growth arrest and angular deformity.
- **Low incidence rates** of this injury render sufficiently powered, prospective research difficult.
- Few studies have focused on practical guidelines for different phases of care (from initial management through final follow-up)
- The purpose of this study was to assess the **current state of management** of these fractures based on the Pediatric Orthopaedic Society of North America (POSNA) membership experience.
- We also aimed to identify **areas of variability** that can help guide a standardization of care and direct future research efforts.

Methods

- 1344 POSNA members were surveyed via an emailed REDCAP survey and anonymous responses were collected within 8 weeks.
- The survey was constructed and reported in accordance with the checklist for reporting results of e-surveys (CHERRIES).
- Survey **pretesting** was performed by a focus group of 6 board-eligible orthopedic surgeons to identify potential issues.
- Survey questions included respondent demographics, experience, practice environment, and clinical questions regarding preferred treatment and postoperative management based, in part, on an **illustrative case**.
- Survey responses were analyzed using descriptive statistics

Results (Survey Responses)

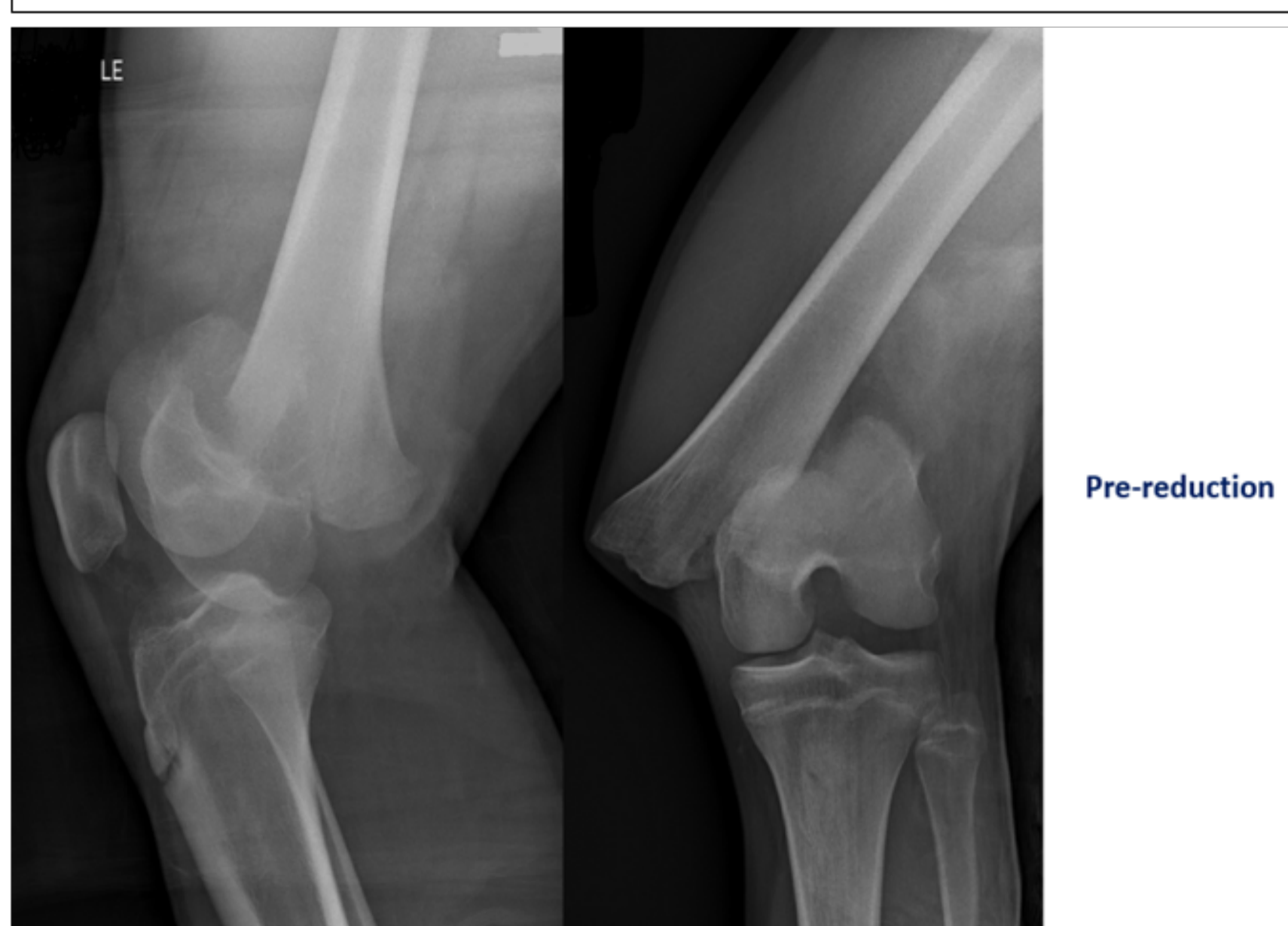
- 376 POSNA members responded to the survey (28% total membership), **333 (88.6%)** members completed the entire survey.
- Respondents' median years in practice were **17 (IQR 7-27)**.

Case Presentation in Survey

An 11-year-old healthy, normal sized (BMI=20), male presents at 10 PM to the Emergency Department (ED) after direct trauma to his knee during a flag-football game.

After a physical examination, the injury is deemed isolated. The skin is intact and there are no signs of compartment syndrome or neurovascular compromise present both on initial examination and after an initial reduction is performed in the ED.

Radiographs, including pre- and post-reduction films, are presented.



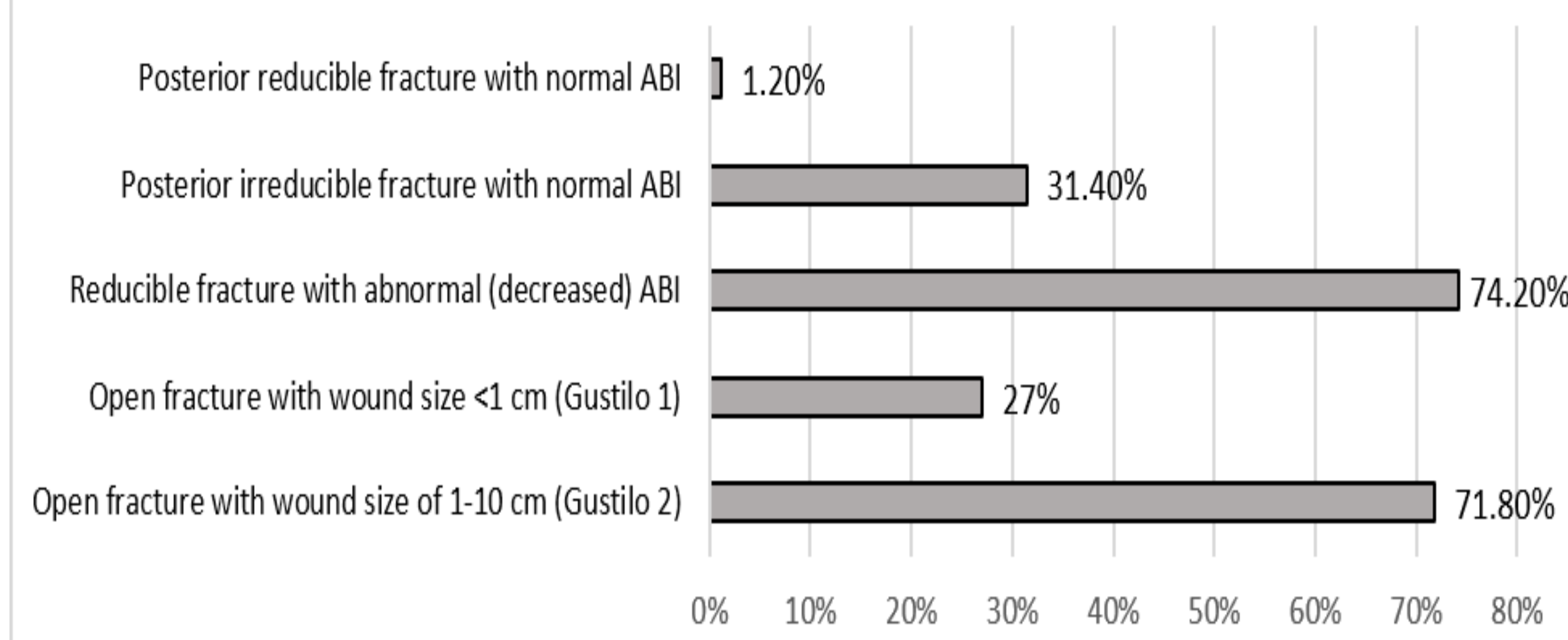
Results (Preferred treatment)

Table 2. Respondent's Preferred Fixation Strategies or the Described Case

Bi-cortical screws parallel to the physis engaging the Thurston-Holland fragment	69%
Hybrid screw and pin construct (i.e., screw in Thurston-Holland fragment and medial Steinmann pin to stabilize the physis)	14.6%
Unicortical screws with cancellous fixation parallel to the physis engaging the Thurston-Holland fragment	6.5%
Retrograde Steinmann pins crossing the physis	6.5%
Antegrade Steinmann pins crossing the physis	2.2%
Antegrade screws	0.6%
Metaphyseal-only Steinmann pins parallel to the physis	0.6%

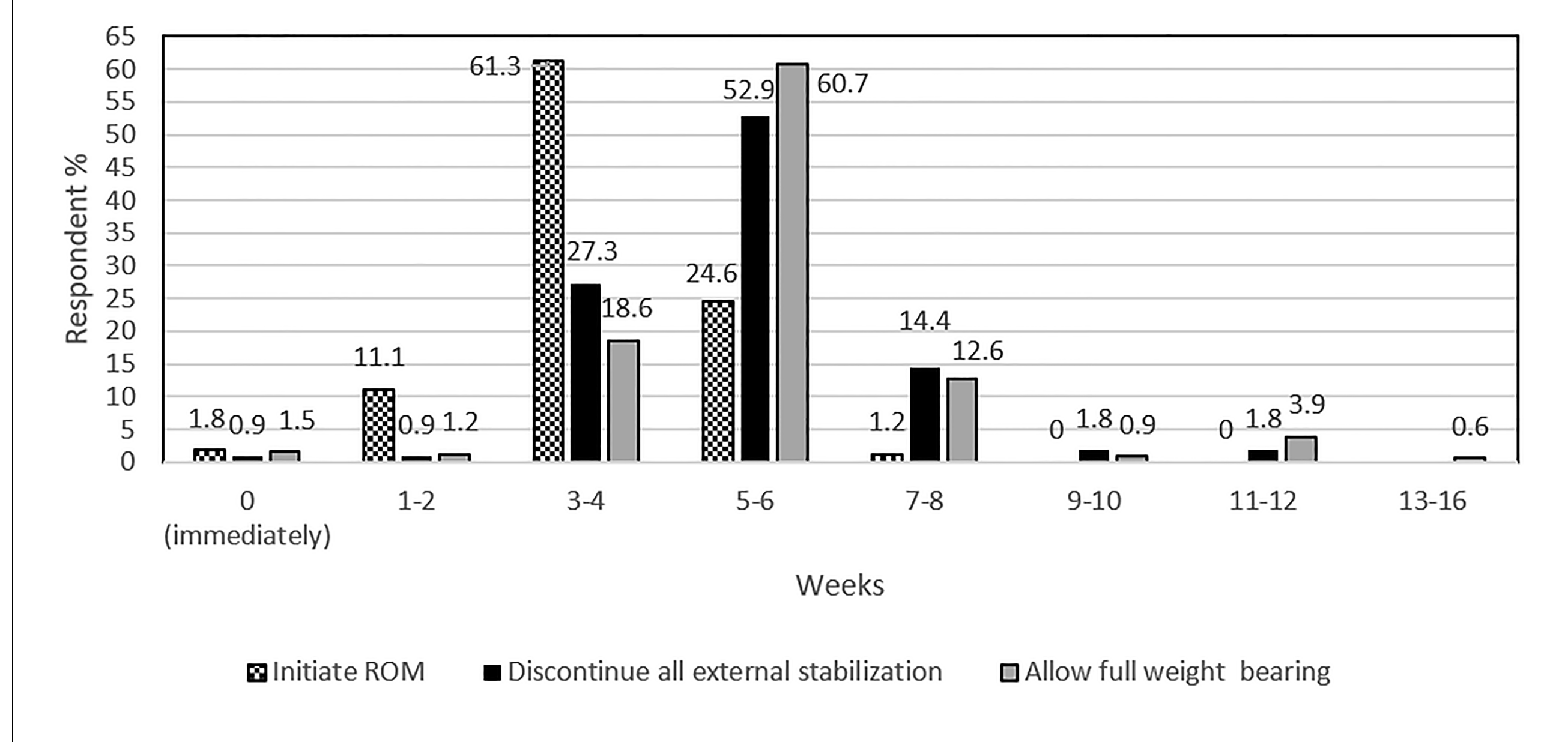
Results (Preferred surgical treatment)

Figure 2. Concomitant Clinical Findings That Would Lead the Responders to Proceed with Operative Intervention in the Middle of the Night



Results (Post-operative treatment)

Figure 3. Respondent's Choices for Post-operative Recommendations



Results (Return to Full Activities)

Table 3. Factors guiding the respondent's decision in allowing SH-II distal femur patients to return to unrestricted activity

Radiographic healing	79.3%
Performance milestones (e.g., single leg hop test, ROM, painless mobilization)	67.9%
Time elapsed from surgery (regardless of fracture union or patient abilities)	33.3%
Other (social status, type of activity to which the patient returns)	1.2%

Discussion

- **Surgical** management of the presented case was preferred by most (**96.3%**) members.
- If no vascular compromise was present (ABI >0.9), some (11.8%) chose to perform the surgery the same night of presentation, but most (**86.6%**) scheduled the case for the **next day**.
- About 1/3 (32.7%) of respondents consider every SH-II fracture as an indication for surgical treatment.
- For immediate post-operative immobilization, most respondents (**44.4%**) preferred **long leg casting** while 23.3% preferred non-hinged knee immobilizer, and 15.5% and 15.8% preferred long leg splint, and hinged knee brace.
- Nearly all respondents preferred **follow-up until skeletal maturity (99.7%)**.
- In cases of suspected **growth arrest** based on x-ray, 76% indicated they would order an **MRI** for further evaluation.
- Percutaneous **pin removal** is typically performed by **6 weeks (91%)**, but more than half (56%) prefer removal by 4 weeks.
- In cases of screw fixation, most (75%) **do not** prophylactically **remove screws**. Those who routinely remove screws (86.4%) do so based on radiographic sign of **union**.
- Inherent limitations are related to the survey methodology including selection bias, which is ubiquitous in survey research, and the single case illustration.
- The survey replicants number is larger than the calculated sample needed (300) to adequately represent the POSNA membership.
- Geographic and demographic distribution of our respondents was wide, indicating a reasonably heterogenous provider population. Moreover, the relatively experienced cohort (average 17 years of practice) offer.

Conclusions

- This study demonstrates a preference for **operative management** of SH-II distal femur fractures among POSNA members, particularly in cases of displaced fractures or those that have failed closed-reduction. Except for immediate post-operative immobilization type, pediatric orthopedic surgeons appear to have **strong agreement** regarding post-operative management and timing of hardware removal for these fractures.
- This study identified commonalities in management of SH-II distal femur fractures among the POSNA membership and may help pediatric surgeons in the **decision-making** process at different treatment crossroads.

References

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