Mobility and Sporting Activity After Renal Trauma: A Survey Regarding Best Clinical Practice During the Recovery Stage

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OBJECTIVE To evaluate strategies that are followed after pediatric renal trauma during the recovery stage, with an emphasis on mobility and involvement in subsequent sporting activities. Renal trauma is the most common urogenital trauma in children. The American Association for the Surgery of Trauma (AAST) scale is most commonly used to stratify the severity of injury. There is no consensus in the existing literature with respect to the recovery stage following renal trauma.

METHODS A survey was constructed by the European Association of Urology (EAU) – Young Academic Urologists (YAU) Pediatric Urology Working Group and then made digitally available on SurveyMonkey. The survey consists of 15 questions exploring relevant factors and timing to start again with mobility and activity.

RESULTS In total 153 people responded, of whom 107 completed the entire survey. The presence of pain and severity of trauma were acknowledged as most important factors to commence mobilization, whereas presence of hematuria was identified as an additional factor for sporting activity. Regardless of severity of trauma a minimum of 90% of respondents recommend return to noncontact sports within 12 weeks. For contact sports, a minimum of 33% of respondents advised > 12 weeks minimum before starting again. A small number of respondents would never allow sporting activities again.

CONCLUSION The time to allow sporting activity shows high variation among the respondents, some even restricting sporting activities completely. This survey highlights the need for a standardized protocol based on multicenter follow-up data. UROLOGY 183: 199–203, 2024. © 2023 The Author(s). Published by Elsevier Inc.

Renal trauma is the most common form of urogenital trauma in children. Children are at a higher risk for severe renal injury due to anatomical differences such as less perirenal fat, a more elastic rib cage, weaker abdominal muscles, and the presence of fetal kidney lobulations.[1] Blunt abdominal trauma is the main cause of renal injury, with 10%-20% of cases resulting in injury to the kidney.

The American Association for the Surgery of Trauma (AAST) scale is most commonly used to stratify the severity of injury, ranging from grades I-V. In the newer classification, published in 2019, the World Society of Emergency Surgery (WSES) kidney trauma classification was introduced. This grading system specifies four grades and is based on the AAST scale, but also includes the hemodynamic status of the patient.[2]

Clinical guidelines for diagnosis and management are provided by the American Urological Association (AUA) and European Association for Urology (EAU), including a separate guideline for pediatric renal trauma, from the perspective of the urologist.[1,3,4] The WSES-AAST has also developed guidelines for urogenital trauma from a surgical trauma perspective.[2] In these

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guidelines, detailed flowcharts are presented for diagnosis and acute management using the AAST and WSES grading systems. A shift from surgical to conservative management for most renal trauma cases has been seen in children and adults. Further, minimally invasive management through embolization is preferably used for the most severe or high-risk cases.[1]

Nevertheless, there is no consensus in the existing literature with respect to the recovery period following renal trauma, neither for children or adults, leaving uncertainty about when it is safe to resume mobility or return to sporting activities after such trauma. This is a crucial clinical concern, particularly for children who are generally more physically active than adults and may experience disruptions to their schooling due to inadequate guidance.

Guidelines from the field of urology do not address resumption of mobility and sporting activities postrenal trauma. However, surgical trauma guidelines suggest that mobility can be resumed once gross hematuria has ceased, and sporting activities may be resumed within two-six weeks after renal trauma for lower-grade injuries, provided that microscopic hematuria has ceased.[2] For more severe renal injuries, refraining from sports for up to 12 months may be necessary.[2] However, there is no mention of pertinent factors that may influence the duration of immobilization needed.

The best clinical practices for resuming mobility and returning to sporting activities following renal trauma are important to understand to ensure the patients' safety and optimal recovery. With the results of this survey, we aimed to observe the opinion of current practice among urologists/pediatric urologists/pediatric surgeons, relevant factors and optimal timing for mobilization and return to sporting activities.

MATERIALS AND METHODS

A digital survey (Supplement 1) was constructed by the EAU-Young Academic Urologists (YAU) Paediatric Working Group members. The survey was created in SurveyMonkey and consisted of a total of 15 questions. The YAU Paediatric Working Group members listed factors that could influence the decision to initiate mobilization or start sporting activity. Based on these factors, questions were composed while timelines which were used in the clinical practices of the members were condensed and expanded in order to create ample answering options. The survey included 13 general questions related to renal trauma management and follow-up schedules used in daily clinical practice with a specific scope on resuming mobility and sporting activity. The relevance of factors for mobility and sporting activity was evaluated based on a 6-point Likert scale. A differentiation was made between contact vs noncontact sports. The difference was not defined in the survey but was considered per interpretation of the respondent. Further, two clinical scenarios were proposed to the respondents. The contents of the survey are available as Supplement 1. Of note, this is not a validated questionnaire since the aim is not to measure the same construct, but to determine general clinical practices. The digital survey was sent out through email by the European Society for Paediatric Urology (ESPU) to its members and a reminder email was sent 4 weeks later. Also, the survey was distributed with a QR-code during the EAU Congress 2022 in Amsterdam and through the social media channels by the members of the YAU Paediatric Urology Working Group, that is, Twitter and LinkedIn.

As this was an observational study of the clinical practice, no interventions, inclusion or exclusion criteria are to be reported. A nonscientific recruitment methodology was used leading to a cross-sectional convenience sample of (pediatric) urology or surgery residents, (pediatric) urologists or surgeons, and fellows. In case of missing values, the average of the actual reported answers was chosen. No imputation of the data was performed, so no missing data was backfilled. Data were analyzed in IBM Statistical Package for Social Science (SPSS) (Version 28 for Windows). The number and percentages are used for nominal data and median and range for nonparametric data.

RESULTS

During the time frame of 11 months, from December 2021 to December 2022, a total of 153 people responded to the survey. Most of the responses (52%) came in after the ESPU sent out an invitation and reminder email. The entire survey was completed by 107 respondents.

Timing to Mobility

For low-grade (AAST I-III) and high-grade (AAST IV-V) renal trauma, the optimal timing for mobilization was inquired. A high variability in timing was reported after low-grade renal trauma. Nevertheless, most respondents would allow the children to mobilize within 2 weeks, see Figure 1. A more conservative approach was reported for high-grade renal trauma, see Figure 1, with 26% of respondents declaring that mobilization is allowed between 3-6 weeks after trauma.

Timing to Sporting Activities

The time after which it was safe to return to sporting activity was questioned separately for contact and noncontact sports. The majority of respondents (> 90%) would allow children to resume noncontact sports within 12 weeks after renal trauma, regardless of severity or type of injury, see Table 1. However, four respondents did not consider it safe for these children to ever play sports again. When asked about return to contact sports a longer waiting time is reported, especially for the higher-grade blunt trauma and penetrating traumas. Still, a majority of > 67% would allow children to play contact sports < 12 weeks after renal

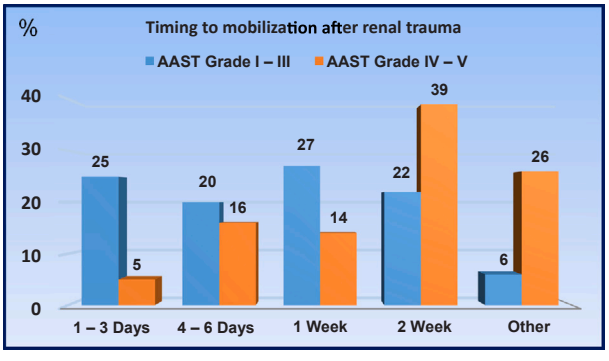

Figure 1. Timing to mobilization after renal trauma. AAST, American Association for the Surgery of Trauma. (Color version available online.)

Table 1. Timing to return to noncontact and contact sports according to severity and type of injury.

	Noncontact Sports		Contact Sports	
	< 6 wk	< 12 wk	< 6 wk	< 12 wk
Blunt trauma AAST I-III	92%	98%	59%	82%
Blunt trauma AAST IV-V	68%	94%	35%	69%
Conservatively managed penetrating trauma	66%	94%	45%	74%
Interventional managed penetrating trauma	66%	90%	42%	67%

AAST, American Association for the Surgery of Trauma.

trauma, see Table 1. Fourteen respondents did not consider it safe for children to ever play sports again.

Relevant Factors Regarding Mobility and Sporting Activities

Respondents were asked about six possible factors: type of trauma (blunt or penetrating), severity of injury, conservative management, interventional management, presence of hematuria and pain, influencing the decision to start mobilization or return to sporting activities. Only the factors pain (median (range): 4 (1-6)) and severity of injury (median (range): 4 (1-6)) were considered important by the respondents for the decision to get back to mobilization. For sporting activity, the presence of hematuria (median (range): 4 (1-6)) was considered relevant in addition to pain (median (range): 4 (1-6)) and severity of injury (median (range): 4 (1-6)).

Follow-up

The follow-up after renal trauma was mostly performed by the pediatric urologist (79%) and the pediatric surgeon (16%). In Figure 2, the duration of follow-up is presented. Most respondents (82%) do not perform a follow-up exceeding 1 year for the low-grade renal traumas. For high-grade renal trauma, a follow-up longer than 1 year is more often performed (36%) with some respondents even reporting a follow-up until adulthood. The modalities used during follow-up are mainly ultrasound (92%) and blood pressure (64%) for low-grade renal trauma. For high-grade renal trauma nuclear imaging (46%) and CT (42%) are more often used additionally, see Figure 3.

Clinical Scenarios

Two clinical scenarios were proposed in the survey:

After a grade III blunt renal trauma in a 7-year-old child, after how long is mobilization possible again?

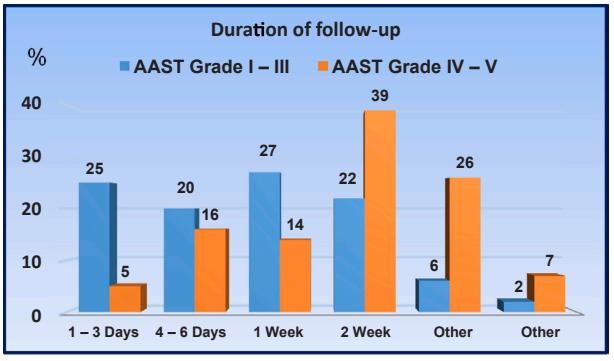

Figure 2. Duration of follow-up according to severity of injury. AAST, American Association for the Surgery of Trauma. (Color version available online.)

This question was answered by 107 respondents. After 1 week, 69% of the respondents allowed mobilization, while 10% would wait 10 days and 21% allowed mobilization after 2 weeks.

In a 12-year-old child with a grade IV blunt renal trauma, still experiencing macroscopic hematuria, after how long is mobilization possible again?

This question was answered by 107 respondents. Most respondents (35%) would wait until hematuria has ceased before mobilization was allowed. Mobilization was deemed possible after 1 week by 29% of the respondents, within 10 days by 8% and after 2 weeks by 28% of the respondents.

Presence of a Protocol

There is no standardized protocol for sporting activities for 96% of respondents; however, there is an evident wish for it as reported by 95% of the respondents.

COMMENT

Various guidelines are available for the acute management of pediatric renal trauma.[1-4] The provided recommendations are consistent and the guidelines are widely used in clinical practice. However, management of the recovery stage after renal trauma remains uncertain and clinical practice guidelines are missing. The results of this study emphasize that daily clinical practice for the recovery stage varies as per the respondent.

Mobilization after renal trauma is commonly reliant on the presence of pain and the severity of injury. In case of low-grade renal traumas mobilization is usually allowed within the first 2 weeks after trauma, but for high-grade renal traumas this could take up to 6 weeks as reported in the survey results. We have specified mobilization as walking and no sporting, but have not distinguished between bed rest and walking. This could explain why an extended period of time is reported for the high-grade renal traumas with up to 6 weeks. After a high-grade renal trauma, which is managed conservatively a longer period of bed rest with mobilization only between sanitary facilities and bed/bench could be indicated. This is however a long immobilization time when we compare this to mobility after iatrogenic renal trauma, for example, after partial nephrectomy, in which case patients usually get bed rest for a couple of days. A systematic review by Gates et al has reported the length of hospital stay after renal trauma.[5] The median hospital length of stay was 6.8 days (range 2-18.2), and the median ICU length of stay was 2.0 days (range 0-4). The

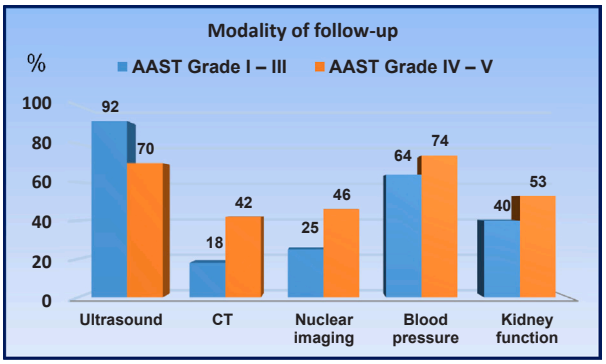

Figure 3. Modality of follow-up according to severity of injury. AAST, American Association for the Surgery of Trauma. (Color version available online.)

majority of cases reported were grade I renal trauma, which could explain the shorter period of mobilization compared to the results found in our survey.

The time to return to sporting activities was reported to be fairly consistent for the noncontact sports, even though there was no given definition of contact and noncontact sports. The majority of the children would be allowed to play sports within 3 months after trauma. However, for contact sports, there was a high variability in the responses. A small, but noteworthy group of respondents state that they do not think it safe to ever play contact sports again after renal trauma. This finding has a major clinical impact in children and will have consequences for them, at least until they reach adulthood. Upon critical review of the literature, no strong evidence was found for this practice.

What causes the respondents' hesitation to allow children to become active again? Overall, the number of complications following renal trauma is low. Fever, persistent urinoma and hematuria have been described as most common complications after conservative treatment.[6] Specifically for children, a necessity for intervention was needed primarily in high-grade renal traumas including embolization of the renal artery, nephrectomy and stent placements for urinary leakage.[5] These interventions are described during the first 2 weeks after renal trauma, a period in which most children are not allowed to become active according to our respondents. The presence of pseudoaneurysms and arteriovenous (AV) fistula can lead to delayed bleeding and/or gross hematuria following renal injury. These also usually occur in the first 2 weeks, but can present years later. Symptoms such as new-onset flank pain and/or abrupt changes in blood pressure should be a cause for extra alertness. On the other hand, penetrating trauma is a risk factor for the presence of pseudoaneurysms and AV fistula, while they are less often seen after blunt renal trauma, but do occur.[7] The impact of a delayed bleeding could warrant a more conservative approach, however, given the rarity of occurrence, no return to sporting activity might be considered too restrictive.

The different radiological modalities used during the follow-up might provide more clarity about the presence of such pseudoaneurysms and AV fistula. Accordingly, ultrasound was the most commonly used modality in the follow-up after low- and high-grade traumas. In the presence of a high-grade trauma, CT was used by 42% of the respondents. It could be proposed that when the risk of a pseudoaneurysm or AV fistula is considered high (which is also subjective), a CT scan is performed to detect such anomalies prior to allowing resumption of sporting activities. The practice to repeat radiologic imaging prior to activity is also commonly used in the UK after high-grade blunt spleen or liver trauma.[8,9]

Additional insights can be gained by exploring the views on the management of mobility and sports after trauma to other solid abdominal organs. For pediatric patients, the American Pediatric Surgical Association (APSA) has developed guidelines for blunt liver and spleen injury. According to the APSA guidelines, no bed rest is required after the injury, and physical activity can be resumed after injury grade in weeks +2 weeks, for example, a patient with grade III injury will be advised to resume physical activity after 5 weeks.[10] These guidelines have been validated in a large cohort of 366 patients and were found to be safe.[11] The Arizona, Texas, Oklahoma, Memphis, Arkansas Consortium (ATOMAC) guidelines, also for blunt liver and spleen injuries, specifically state that it is safe for children to return to school when comfortable and able.[12] This comes along with appropriate activity and contact restrictions. Of note, high-quality evidence exists to support this recommendation. There is a low risk of rebleeding which patients and parents should be aware.

We consider that an adapted guideline for the recovery stage after renal trauma could be based on the surgical guidelines. One distinctive factor after renal trauma is the presence of hematuria which influences time to activity for this specific group. A proposed strategy could be grade of injury in weeks +2 weeks, after ceasing of macroscopic hematuria. For instance, a child with grade IV injury can resume sport activities 6 weeks after macroscopic hematuria has ceased. Children and parents should be instructed about the clinical symptoms that herald rebleeding. However, this adapted strategy needs to be tested in a prospective multicenter study to compare outcomes and complications between patients managed conservatively and those managed surgically.

This study has some limitations that need to be addressed. We do not have data about the demographics of respondents. This could affect the interpretations of our findings; however, the survey was disseminated through the official channels of the ESPU and during the EAU Congress. Thus, it is not possible to perform an analysis of differences in the treatment/notion between different countries or even continents. Moreover, we have no data on the number of recipients of the survey, only the responders. No analysis between nonresponders and responders is possible which could be regarded as a bias,

since some recipients might be more likely to respond than others. There is a high number of missing responses to certain questions. The way the survey was constructed provided the respondent with multiple answering options without requiring an answer for the different individual components of a question. For this reason, we decided not to impute the missing values, but only reported on the answers provided.

CONCLUSION

Given the great variation presented in the management of the recovery stage, especially regarding mobility and sporting activity after renal trauma in pediatric patients, this study highlights the need and importance of clarity and evidence-based guidance for this group of patients.

In order to determine the optimal management of mobility and sporting activity after renal trauma, well-established further research is needed. Maybe, an adaptation of the current guidelines for blunt liver and spleen trauma could be verified for the recovery stage after renal trauma.

Declaration of Competing Interest

The authors have no relevant conflicts of interest to report for this study.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.urology.2023.09.030.

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