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# Risk Factors of Autonomic dysreflexia during Urodynamic study in subacute spinal cord injury patient

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## Objective

- The aim of this study is to identify the association factors with AD during urodynamic study (UDS) in SCI patients at or above T6 level within subacute period.

## Methods

- Retrospective cross-sectional study.
- Reviewed 110 patients with subacute spinal cord injury at or above the T6 level who underwent urodynamic study between 2015 and 2022.
- The subacute period was defined as 91–180 days after injury.
- Blood pressure was measured before and during UDS to monitor for autonomic dysreflexia, defined as an increase in systolic blood pressure of ≥20 mmHg from baseline.
- Urodynamic parameters including bladder compliance, detrusor activity, bladder capacity, voided volume, and post-void residual urine were analyzed.
- Binary logistic regression was performed to identify independent factors associated with AD.

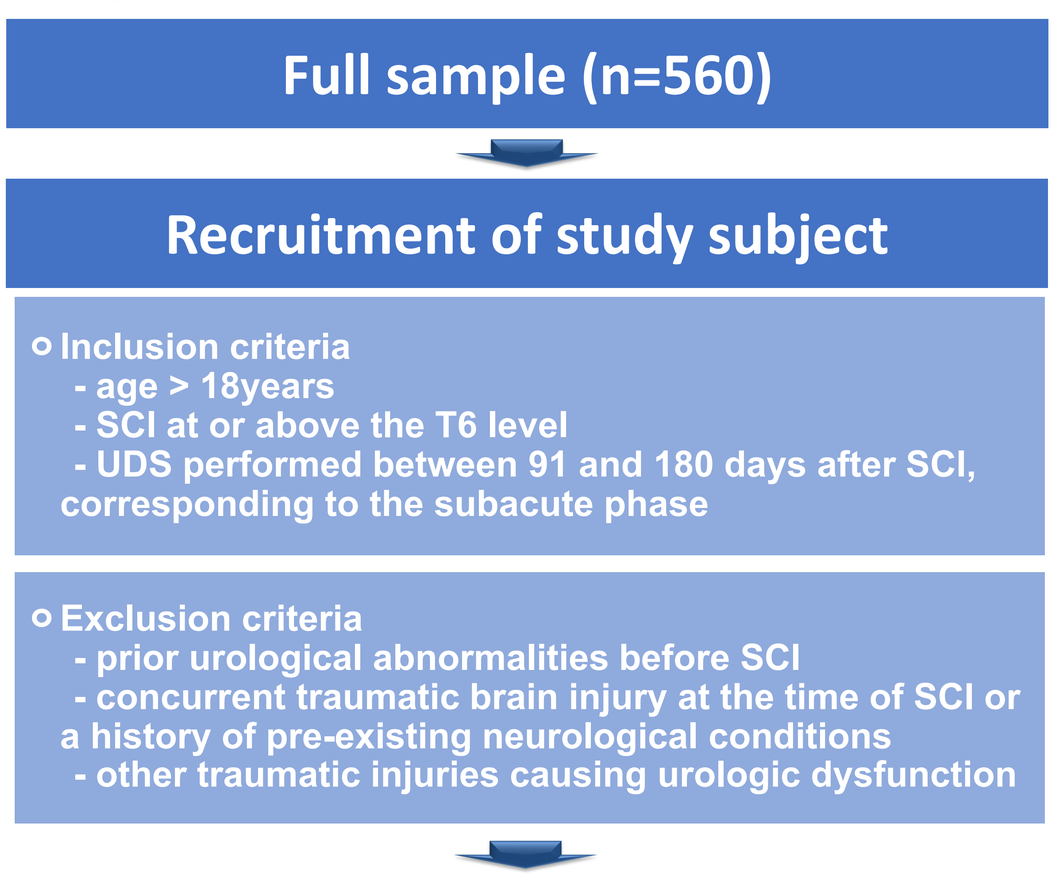


**Figure 1.** Flowchart about sample selection

## Results

- Among the 110 patients included in the study, 21 (19%) developed AD during UDS. There were no significant differences in demographic or injury-related characteristics between patients with and without AD.

**Table 1.** Association between AD and UDS continuous variables

| | With AD group | | Without AD group | | r | p |
|---|---|---|---|---|---|---|
| | M | SD | M | SD | | |
| Bladder compliance | 43.58 | 56.61 | 114.62 | 143.14 | -0.210[d] | **.028** |
| Bladder capacity | 505.24 | 166.69 | 513.25 | 124.96 | -0.024[d] | .805 |
| VV | 0.00 | 0.00 | 81.07 | 161.07 | -0.216[d] | **.023** |
| PVRU | 494.29 | 185.57 | 420.90 | 218.28 | 0.136[d] | .158 |
| Max Pdet at filling | 35.48 | 22.35 | 24.20 | 24.90 | 0.180[d] | .060 |

d: Pearson correlation.
Bold is statistically significant.
Abbreviations: VV, voided volume; PVRU, post-voided residual urine; Pdet, detrusor pressure

**Table 2.** Association between AD and UDS binary variables

| | With AD | | Without AD | | r | p |
|---|---|---|---|---|---|---|
| | N | % | N | % | | |
| Detrusor function at filling | | | | | | |
| DO | 15 | 71.4% | 37 | 41.6% | 0.235[b] | **.014** |
| Normal | 6 | 28.6% | 52 | 58.4% | | |
| Detrusor function at voiding | | | | | | |
| DU or Acontractile | 21 | 100.0% | 75 | 84.3% | 0.185[b] | .052 |
| Normal | 0 | 0.0% | 14 | 15.7% | | |
| Urethral function at voiding | | | | | | |
| DSD | 1 | 4.8% | 8 | 9.0% | -0.061[b] | .525 |
| Normal | 20 | 95.2% | 81 | 91.0% | | |

b: Phi coefficient.
Bold is statistically significant.
Abbreviations: DO, Detrusor overactivity; DU, Detrusor underactivity; DSD, Detrusor-sphincter dyssynergia

- Among urodynamic parameters, bladder compliance showed a significant negative correlation with AD occurrence, indicating that lower compliance was associated with a higher risk of AD. Voided volume (VV) was also significantly associated with AD. In addition, detrusor overactivity (DO) during the filling phase was more frequently observed in patients who developed AD.

**Table 3.** Binary logistic regression analysis results on AD

| | B | SE | Wald $\chi^2$ | p | OR (95% CI) |
|---|---|---|---|---|---|
| (Constant) | -0.66 | 0.37 | 3.20 | .074 | 0.519 |
| Bladder compliance | -0.01 | 0.01 | 4.62 | **.032** | 0.988 (0.977-0.999) |
| (Constant) | -1.10 | 0.25 | 19.01 | <.001 | 0.333 |
| VV | -0.64 | 51.90 | 0.00 | .990 | 0.526 (0.000-7.939) |
| (Constant) | -0.90 | 0.31 | 8.70 | .003 | 0.405 |
| Detrusor function at filling (ref=DO) | -1.26 | 0.53 | 5.65 | **.017** | 0.285 (0.101-0.802) |

Nagelkerke $R^2$=0.129; 0.176; 0.088.
Abbreviations: VV, voided volume; DO, Detrusor overactivity; OR, Odds Ratio; SE, Standard Error; CI, Confidence Interval.

- In the binary logistic regression analysis, bladder compliance and detrusor overactivity remained independent predictors of AD. Specifically, decreased bladder compliance and the presence of DO were associated with an increased likelihood of AD during UDS.

## Conclusion

- In this study, the risk of autonomic dysreflexia increase in subacute SCI patients with low bladder compliance or detrusor overactivity in UDS results.
- Urodynamic evaluation during this phase may allow early risk stratification and support timely therapeutic interventions.