



Impact of MIOM for Spine Deformity Surgery and Risk Factors for Neurologic Monitoring Changes

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Objective

- **Evaluate efficacy of MIOM during correction of spine deformity**
- **Evaluate the risk factors for neurologic monitoring changes(NMCs)**

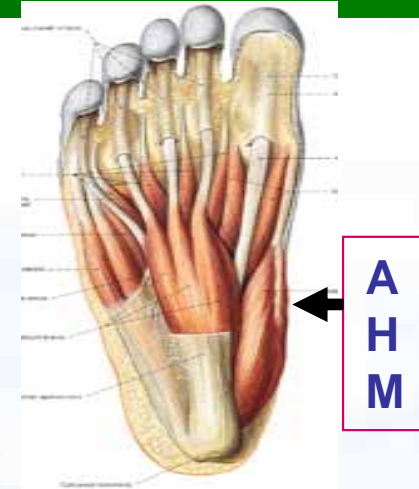
➤ Demography

- 176 cases of spinal deformity
- : =1 : 1.9
- Age 17.8 (2 to 62)
- Operation strategy: deformity correction from one stage posterior approach
- Osteotomy strategy
 - PSO、Thompson osteotomy、VCR、Smith-Peterson

Methodology

➤ MEP

- Stimulator: C3-C4
- Recording: abductor hallucis (AHM)



➤ SEP

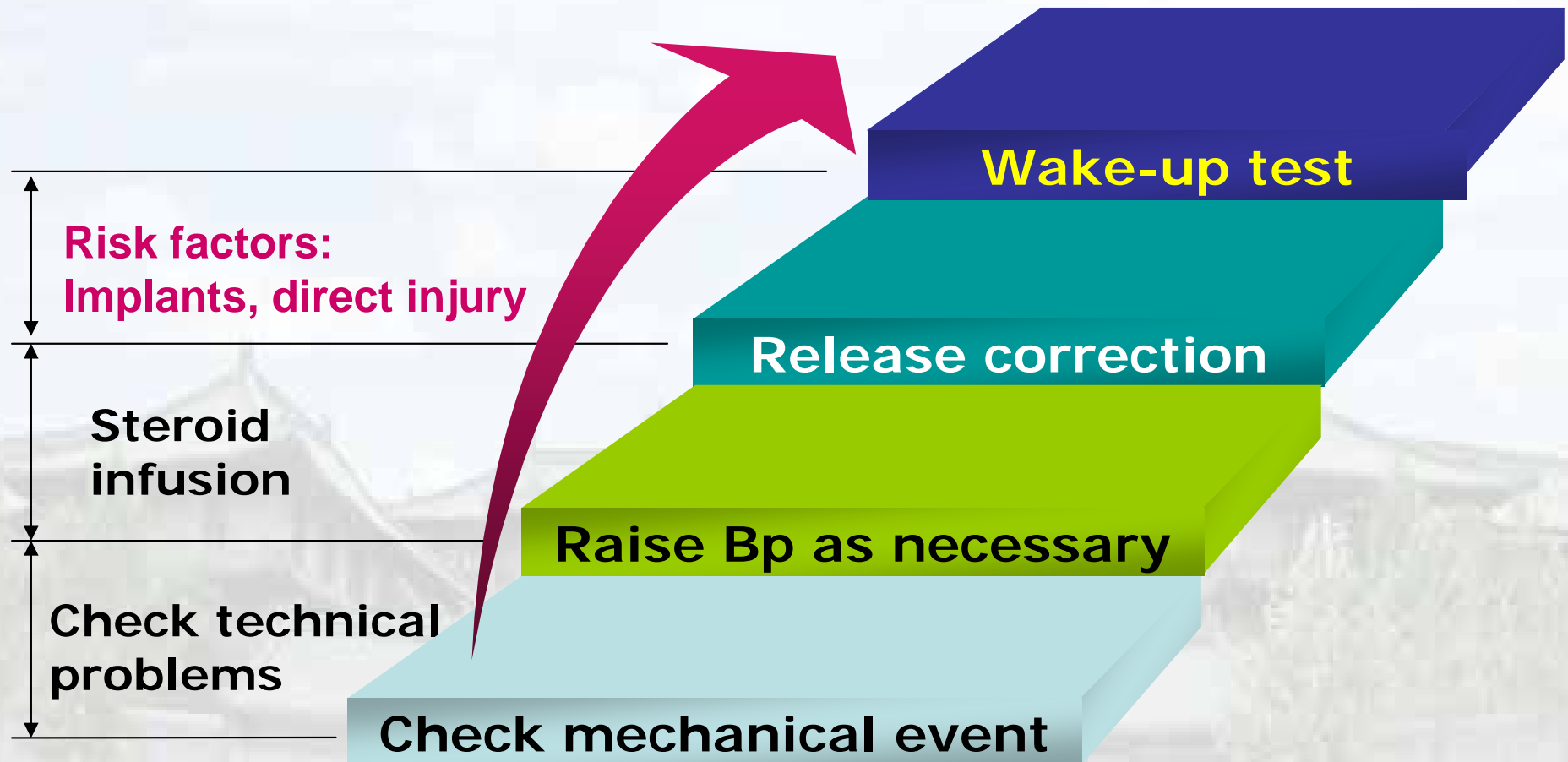
- Stimulator: Posterior tibial nerve
- Recording: Cz-FPz



➤ Diagnosis criteria

- MEP loss amplitude more than 75%
- SEP loss amplitude more than 50%

Intervention for positive changes



**J Bone Joint Surg Am.* 2010;92:64-71

Eurospine 2011

Results

Modality	NMC(+)		NMC(-)		Patient number	Sensitivity	Specificity
	NE(+)	NE(-)	NE(+)	NE(-)			
MEP	11	2	1	158	172	91.7%	98.8%
SEP	6	4	6	80	96	50%	95.2%
MEP/ SEP	13	1	1	160	175	92.9%	99.4%

PS: **NMC**, neuromonitoring change; **NE**, neurologic event;



Results and intervention

Factor for NMCs	Case numbers	Intervention
Distraction	3	release
Implants malposition	2	Removal implants
Low blood pressure (mean BP less than 60mmHg)	3	Increase Bp
Compression from kypho	1	Resection bone prominence
Direct injury during osteotomy	2	Steroids and decompression

Risk factors for NMCs

Title observed	Item	Cases	NMCs	Incidence (%)	Chi-square tests (P)
Procedure	Osteotomy	44	7	16%	P < 0.01
	No osteotomy	131	4	3%	
Kyphosis	With kyphosis	15	3	20%	P=0.02
	Without kyphosis	160	8	5%	
Cobb's angles (major curve)	< 90 °	29	5	17%	P=0.01
	90 °	132	6	5%	
Preoperative neurologic deficit	presence	15	2	13%	P > 0.05
	absence	160	9	7%	
Spinal cord deformity	presence	22	1	5%	P > 0.05
	absence	153	10	7%	



Discussion

➤ **SEP monitoring**

- **Advantage: Continuous; Monitor dorsal column**
- **Disadvantage: No monitor motor function; Intervention for positive changes; Low sensitivity**

➤ **MEP monitoring**

- **Advantage: directly monitor motor function; high sensitivity; Instant changes than SEP**
- **Disadvantage: necessity for quit procedure; paralytic agents were forbidden**



Risk factors for NMCs

- **Risk factors for neurologic deficits in literature***
 - CS, hyperkyphosis, Cobb's angle
- **Advantages of observing NMCs to Deficits**
 - Detectable, reversible during OP
- **Risk factors for NMCs according to our study**
 - Kyphosis
 - Severe scoliosis
 - Osteotomy procedure

* Qiu Y, Wang S, Wang B, et al. Spine (Phila Pa 1976). 2008 Mar 1;33(5):519-26.



Conclusion

- **MIOM can provided higher sensitivity and specificity than single modality alone during spinal deformity surgery**
- **Osteotomy procedure during corrective surgery, kyphosis correction and Cobb's angle more than 90 ° may be correlated with more NMCs.**



Conflict of Interest Disclosure

None of the authors has any potential conflict of interest .