

Modified Clavien-Dindo (MCD) Classification For Adverse Events after Surgery in Children with CP: A Multidisciplinary, Reliability Study

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CLINICAL RESEARCH

Reliability of a Complication Classification System for Orthopaedic Surgery

Ernest L. Sink MD, Michael Leunig MD, Ira Zaltz MD,
Jennifer Claire Gilbert MS, John Clohisy MD,
Academic Network for Conservational Hip Outcomes Research Group

Why we need a Classification System?

There is no accepted “gold standard”

Adverse events happen: 0%-60%

Existing systems are opaque and subjective

“Mild, moderate, severe “

Classification systems should be valid, reliable
and easy to use

It would be a bonus if Nurses, Physiotherapists,
Surgeons and persons with CP could agree

Modified Clavien Dindo (MCD)

Defined by the treatment needed.

Grade 1: MORE OF SAME eg increased observation, more of same medications, (not new medications) increase infusions eg morphine bolus, more of same chest Physio. Minor adjustment of a splint or brace by an orthotist routinely visiting the ward or clinic.

Grade 2: NEW MEDICAL/NON-OPERATIVE/WARD/ OP TREATMENT: NEW prescription for antibiotics, new/additional pain meds, adjust the epidural catheter position. Split cast for numbness or inability to move toes, in ward, not a routine split in operating theatre. Complete cast change. Major adjustment or replacement of a brace or splint by an orthotist.

Modified Clavien Dindo (MCD)

Defined by the treatment needed.

Grade 3: SURGICAL TREATMENT or TREATMENT WHICH REQUIRES A GA OR TRIP TO THEATRE- WHICH WAS NOT PLANNED Unplanned general anesthetic/return to operating theatre even if there is no operation. Re-site epidural, insert urinary catheter or IV line, adjust fixation, change cast for ? Compartment syndrome, inject Botox for spasms. Remove drain from incision. Drain abscess, release haematoma

Grade 4: LIFE THREATENING OR ORGAN DAMAGE. Unplanned admission to ICU with or without full recovery. Tracheostomy. Organ damage. Grades 2-5 AVN hip, renal failure, liver failure. Permanent nerve injury. Ischaemic contracture. Chronic Regional Pain Syndrome (CRPS) at > 12 months

Modified Clavien Dindo (MCD)

Defined by the outcome

Grade 1: FULL RECOVERY, after more of same

Grade 2: FULL RECOVERY, after new medical treatment

Grade 3: FULL RECOVERY, after treatment/surgery under GA

Grade 4: LIFE THREATENING Can be full recovery eg severe pneumonia, ICU tracheostomy, prolonged hospitalisation, then slow/full recovery.

PERMANENT DISABILITY Most have permanent disability AVN, nerve injury, neuroma and chronic regional pain syndrome, compartment syndrome with ischaemic contractures, deep infection with chronic osteomyelitis which can not be eradicated.

Grade 5: Death: within 3 months of surgery

Modified Clavien Dindo Grade 1

Grade I: A complication that requires no additional treatment and has no long term clinical relevance; there is no deviation from routine follow-up during the postoperative period; allowed therapeutic regimens include: epidural infusions, analgesics IV, PEG or oral analgesics, antispasmodics (diazepam), laxatives, anti-emetics, antipyretics, antibiotics, and physiotherapy

EXAMPLES: postoperative pain and spasms, fever, nausea, constipation, wound problem not requiring a change in postoperative care.
Asymptomatic Grade I or II heterotopic ossification; Grade 1 AVN. Skin redness from a cast or splint without skin breakdown.

Rx=MORE OF SAME eg increased observation, more of same medications, (not new medications) increase infusions eg morphine bolus, more of same chest Physio. Adjust cast or splint in ward or clinic.

OUTCOME: Full recovery

Modified Clavien Dindo Grade 2

Grade 2: A deviation from the normal postoperative course that requires ward treatment, outpatient treatment: either pharmacologic or close monitoring as an outpatient

EXAMPLES: Significant pain, increased muscle spasms requiring new/additional epidural boluses or new drugs, Ketamine or Morphine infusions, Clonidine, Gabapentin, Baclofen etc. New drugs for spasticity or dystonia. Enemas for constipation. Superficial wound infection (additional clinic visits/antibiotics/dressings); transient neurapraxia from positioning or surgical retraction that resolves under close observation; nerve palsy requiring bracing and close observation (complete resolution); delayed union requiring increased observation. Anaemia. Pressure sores from casts or splints.

Rx=OBSERVATION, MEDICAL TREATMENT: pain meds, tone meds, antibiotics, dressings, blood transfusion, TPN, feeding tube. Pressure sores requiring dressings, complete (unplanned) change of cast or splint. Excludes planned change of plater casts at 3 weeks to fabricate AFOs.

OUTCOME: Full Recovery

Modified Clavien Dindo Grade 3

Grade 3: A complication that is treatable but requires surgical, endoscopic, or radiographic interventions. Unplanned GA, return to operating theatre or an unplanned hospital admission.

EXAMPLES: Deep infection (drainage); surgical hematoma (evacuation); compartment syndrome or neurovascular injury requiring surgical treatment or change of cast under GA, manual evacuation for faecal impaction under GA, unplanned Botox injections for increased spasticity, tracheostomy, endoscopy for bleeding from the gut, clinically significant heterotopic ossification that requires surgical excision; deep vein thrombosis/pulmonary embolism (admission and anticoagulation)

Rx=Drain abscess, evacuate haematoma, fasciotomy, nerve decompression, endoscopy

OUTCOME: Full recovery

Modified Clavien Dindo: Grade 4

Grade 4: A complication that is life threatening, requires ICU admission, or is not treatable with potential for permanent disability; a complication that requires organ resection eg excision of femoral head for AVN

EXAMPLES: Severe respiratory disease eg aspiration pneumonia, requiring ICU, intubation, bronchoscopy, tracheostomy.

Permanent nerve injury; major vascular injury; pulmonary embolism; CNS complications eg encephalopathy after hypoxic episode, prolonged seizures or a blocked shunt; organ dysfunction, AVN
Grades 2-5

Rx= UNPLANNED ICU admission, nerve grafting, THA or femoral head excision for AVN

OUTCOME: Usually some degree of permanent disability, chronic pain
Sometimes a deterioration in GMFCS Level,

Modified Clavien Dindo: Grade 5

Grade 5: Death, within 3 months of surgery, that can in any way be linked to the index surgery

Eg recurrent respiratory disease, sepsis, organ failure, Pulmonary Embolism.

Death following an event that can not plausibly be linked to surgery eg a MVA is excluded

Independent verification by a colleague, is advised

Modified Clavien Dindo (MCD)

Grade 1: common examples in CP

Gut: constipation, nausea, vomiting, Usual meds

Pain, spasms, increased spasticity or dystonia

Skin: inflamed from cast, splint, dressing, rash

Chest: Hypoxia O2 sats low, fever, cough

Incisions: bleeding, inflammation

Cast: feels tight but does not need changed or split

IDC: irritation from catheter

Seizures, tingling, temporary alteration in sensation
or movement

Modified Clavien Dindo (MCD)

Grade 2: common examples in CP

Gut: severe constipation: more/new laxatives or enemas

Pain, spasms, increased spasticity or dystonia: adjust epidural position, new meds, new infusion

Skin: split or change cast (in ward, no GA), adjust splint

Nerves (motor and sensory): Remove pressure from nerves by flexing knee, splitting cast, removing cast or splint: full recovery

Chest: Chest physio, IV antis CPAP

Incisions: change dressing, pressure bandage, antis for superficial wound infection

Transfusion for anaemia and low blood pressure/low output

Order air mattress, new dressings

IDC: antis for UTI, catheterize for acute retention in Ward

Modified Clavien Dindo (MCD)

Grade 3: common examples in CP

Gut: GA for manual dis-impaction, faecal impaction,

Pain: GA for a new epidural, Botox/cast for spasms

Skin: change cast GA, debride or skin graft a pressure sore

Chest: Bronchoscopy, bronchial lavage GA,

Incisions: drain haematoma or pus in theatre, change hardware or remove hardware early, apply hip spica: full recovery

Retention: catheterize under GA, cystoscopy for haematuria

Fasciotomy for compartment syndrome, in time for full recovery of muscle and nerves

Surgical decompression of nerves: full recovery

Endoscopy or surgery for bleeding ulcer, bowel obstruction,

Modified Clavien Dindo (MCD)

Grade 4: common examples in CP

Unplanned ICU for chest/pneumonia or organ failure; ventilation

Pancreatitis, bowel obstruction with permanent disability

Chronic osteomyelitis, especially around an implant

Permanent nerve injury, compartment syndrome with contracture

Avascular necrosis hip: Grades 2-5

Growth arrest with limb shortening or angular deformity

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Grade 5: common examples in CP

Death, within 3 months of surgery

From any reason that might be causally linked to surgery. Relapse in respiratory disease, organ failure, pulmonary embolism, exacerbation of seizures.