INTRADIALYTIC INTRALIPID: "HOW TO" GUIDE

Kirsten Thompson, MPH, RDN
Seattle Children's Hospital

BACKGROUND

- Enteral nutrition is the preferred route for nutritional support in children who have suboptimal growth.
- Non-compliance with oral supplements and/or tube feedings can be an issue, especially in older children and adolescents.
- Intradialytic parenteral nutrition (IDPN) has long been used to augment nutrition in malnourished hemodialysis patients.
  - Expensive, requires substantial resources not available at many dialysis units.
- Intradialytic Intralipid therapy (IL) alone can be utilized to augment nutrition in children who have failed to show improvement in their nutritional status on enteral supplements alone.
- 2017 Outpatient Dialysis Unit at Lucile Packard Children's Hospital published a study on their utilization of IL therapy in pediatric HD patients.
  - Haskin O, Sutherland SM, Wong CJ. The Effect of Intradialytic Intralipid Therapy in Pediatric Hemodialysis Patients. **J Ren Nutr**, Volume 27 (2), March 2017: 132-137.

BACKGROUND

- Retrospective chart review of all pediatric HD patients receiving IL for at least 3 months between July 2011-July 2014.
- Patients were started on IL therapy when no improvement in nutritional status was demonstrated on oral supplements alone.

Data collected:

- Baseline renal disease, age, date of starting dialysis
- Anthropometrics: Weight, height, BMI at the start of dialysis
  - SDS was calculated according to the CDC growth charts
- Post-dialysis blood pressures and anti-hypertensive medications
- Dose of IL therapy, duration of treatment, reason for discontinuation
- Labs: Pre-dialysis BUN, albumin, creatinine, hemoglobin, transferrin, PTH, nPCR, triglycerides, total cholesterol, HDL, LDL
  - Patients with active glomerulonephritis with pre-dialysis BUN >100 and nPCR >1.8 were excluded.

BASELINE CHARACTERISTICS

- 15 patients received IL therapy (50% Male/Female)
- Median age: 12.5 years; Range: 1-20 years (range)
- 3 patients had feeding tubes
- Dose of IL (g/kg)
  - Median: 0.5g/kg; Range: 0.23-1g/kg
- Length of therapy
  - Median: 6 months; Range: 4.75-7.25 months
  - All received therapy 3 times/week during HD sessions
- All patients were prescribed commercially available renal appropriate oral supplements and/or protein bars for ~4 months prior to starting therapy.
- Reason for Discontinuation
  - Transplant (n=5), improved nutrition (n=3), change in modality (n=2), cont'd therapy (n=5)

SUMMARY OF RESULTS

- 5% average weight gain during IL therapy
- 6 patients had improved SDS for weight
- 8 patients had improved SDS for BMI
- 8 of 12 showed favorable change in weight SDS decline
- Significant improvement in albumin, predialysis BUN and nPCR levels.
- Electrolyte and C02 levels were stable during treatment.
- One patient had IL therapy held for 1 month after TG levels doubled. TG levels returned to baseline and IL therapy was resumed.
- No adverse events recorded

SUMMARY OF RESULTS

- IL therapy had positive effect on protein balance-
  Possible theories…
  - Increased fatty acid availability spares protein degradation
  - Improved oral intake
    - IL administration may decrease circulating levels of peptide YY, a hormone that suppresses appetite.
- Average cost significantly cheaper than IDPN
  - IL $30 per treatment
  - IDPN $170 per treatment

IDIL THERAPY AT SEATTLE CHILDREN'S (SCH)

- **Case #1:** June 2017- first patient at Seattle Children's received IDIL therapy

Baseline characteristics:
- Age: 3 years, 8 months
- Weight: 11.1 kg, <3%ile, SDS -3.41
- BMI: 15.1 kg/m2, 25%ile, SDS

Baseline labs:
- TG 71, Chol 110, HDL 27, LDL 69

Lipid Dose
- 0.5g/kg x 1 week
- Goal: 1g/kg, 60 mls over 3 hours, 4 days/week
- Average intake: 86 cal/day, ~8% total calories

Enteral support
- Suplena + Renastart + baby food (~1200 cals, 27g protein)

CASE #1

- Time on therapy: 4 months
- Reason for discontinuation: transfer of care
- Anthros at end:
  - Weight: 12.2 kg, <3%ile; SDS -2.78 (improved from -3.41)
  - BMI: 16.7 kg/m2, 75%ile
- Held lipids for 2 weeks due to headaches, no other adverse side effects
- Albumin worsened from 4.3→3.6
- Overall improvement in nutritional status

IDIL THERAPY AT SCH

- Developed a protocol after successful trial with 3 patients in the HD unit
- **Criteria for consideration:** Patients receiving HD that have two or more of the following clinical parameters despite maximal enteral nutritional therapy:
  - 1. Serum albumin less than or equal to 3.4mg/dl
  - 2. BMI less than or equal to 20 kg/m2 or weight loss of 5% or more over 3 months
  - 3. Evidence of malnutrition including:
    - a. Weight loss of usual body weight of > 7.5%
    - b. Weight/length or BMI z-score < -2.0
    - c. Mid-upper arm circumference (MUAC) z-score < -2.0
    - d. < 50% expected weight velocity for age
    - e. Deceleration of weight for length/height z-score of < -2.0

IDIL THERAPY AT SCH

Administration

- Initiation dose: 0.5g/kg/day x 1 week
- Advance to 1g/kg/day (goal)
- Infusion rate should not exceed 5 mg/kg/min or 15gm/hour (75 ml/hr of 20% lipid), whichever is lower.
- A minimum dialysis treatment time of 3 hours is required for IDIL therapy.
- Contraindicated in patients allergic to eggs.

IDIL THERAPY AT SCH

Monitoring

- Serum triglycerides, total cholesterol, HDL, LDL, AST, and ALT are assessed at baseline prior to initiation and monthly thereafter.
  - Non-fasting, prior to lipids infusion
- Guidelines for elevated triglyceride levels:
  - Consider initiating omega-3 supplementation if triglyceride levels are **> 300 mg/dL** or total cholesterol is **> 200 mg/dL**.
  - Holding lipid therapy is recommended if triglyceride levels are **> 500 mg/dL**
- RD performs monthly nutritional assessments using Albumin, BUN, PCR, EDW changes, and anthropometric data.
- The RD assesses tolerance to lipid therapy and adjusts lipid dose in collaboration with Nephrologist.

IDIL THERAPY AT SCH

Costs	500 ml 20% Intralipid	IDPN
To the patient	$251.85	$1120.50
To the hospital	$33.47	

CASE EXAMPLE #2

- Emma- 3 years at initiation, struggled with PD and transitioned to HD 5 days/week
- **Baseline Anthros:**
  - Weight: 10.2 kg, <3; SDS -3.08
  - BMI: 14.5 kg/m2, 10-25%ile; SDS -1.14
- Dose: 0.5g/kg x 1 week then increased to 1g/kg/day (60 mls 5x/week over 3 hrs)
- Average calories, 85 cal/day, 8% total calories
- Diet: Oral diet (minimal intake) + enteral feeds

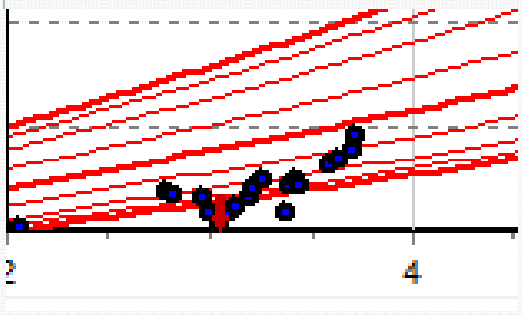
TG levels were elevated at baseline

- Initiated Omega 3 fatty acids

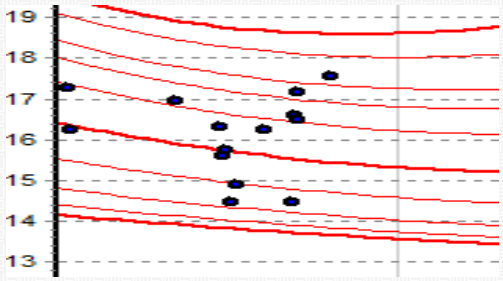
CASE STUDY

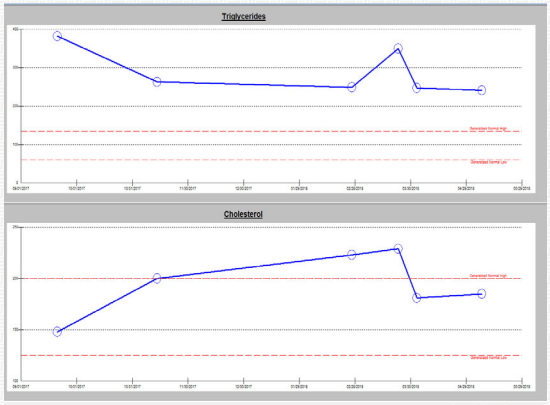
- Therapy Duration: 3 months
- Reason for discontinuation: Transition back to PD
- **Post-therapy Anthros:**
  - 12kg, 5-10%ile, SDS -1.55
  - BMI: 16.2 kg/m2, 50-75%ile
- Failed PD, after 1 month transitioned back to HD and resumed lipids
- Discontinued therapy after 3 months due to above average weight gain

WEIGHT TRENDS



BMI TRENDS

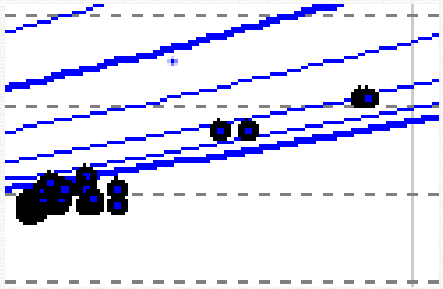




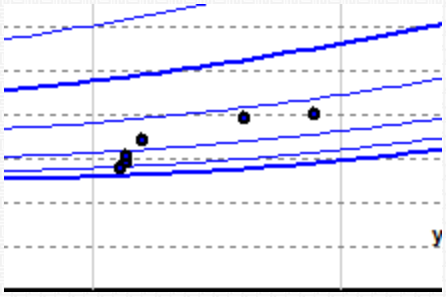
CASE EXAMPLE #3

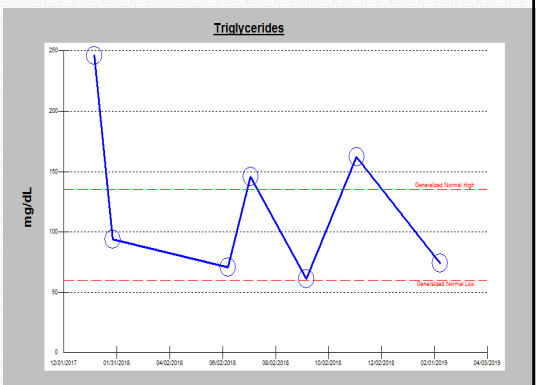
- John- 8 years, 9 months at initiation
  - Refugee family from Micronesia
- Baseline characteristics:
  - Weight: 20.2 kg, <3%ile, SDS -2.43
  - BMI: 13.4kg/m2, 5-10%ile
- Labs: TG 94, Chol 145, HDL 50, LDL 46
  - Repeat: TG 246
- Dose: 0.5g/kg x 1 week then increased to 1g/kg/day
  - 105 mls 3x/week over 3.5 hrs
- Average calories, 90 cal/day, 5% total calories
- Diet: Oral diet, did not tolerate oral supps
- Therapy Duration: Feb 2018-Present

WEIGHT TRENDS



BMI TRENDS





IDIL THERAPY AT SCH

Current data:

- N=12, 6/2017-Present
- 3 discontinued lipids due to good weight gain or transfer of care, remaining 9 still on lipids
- Average age 9 ½ years, range 15 months- 19 ½ years old
- No adverse side effects
- Overall uptrend in Z-scores for weight and BMI
- No trends with albumin levels
- Most effective in patients receiving enteral nutrition + diet vs oral diet alone
- Biggest improvements seen in the younger population i.e. toddlers and young children
- Need to be more consistent with checking TG levels

SUMMARY

- IDIL can improve nutritional status in dialysis patients when used as an adjunct therapy to enteral/oral feeds.
- More cost-effective
- Requires less monitoring i.e. labs
- Easier to administer than IDPN