The 3 H’s of Pediatric Plastic Surgery

Hemangiomas

Hidradenitis Supprativa

Head Shapes
New Trends for Treatment in 2019

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Disclosures:

• The authors have **no financial disclosures** to report in relationship to this topic and research.
All Studies have been IRB approved by the Cleveland Clinic Florida IRB committee.
Hemangiomas

Today's Treatment

Modalities

Myths and Methods
Multiple treatment strategies

- Observation
- Steroids
- LASER
- Vincristine/Bleomycin
- Interferon alpha
- Surgical excision
Propranolol for Severe Hemangiomas of Infancy

Pulse Dye Laser Therapy
Intralesional Steroid Injection
Surgical Excision
New Concept

Combination Therapy
Propranolol followed by Laser and Intrallesional Injection
# Results: last 8 patients with combined therapy

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<thead>
<tr>
<th>Case</th>
<th>Age</th>
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<th>Outcome</th>
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Case Report JG: 3 treatments in the OR, Propranolol 2mg/kg/D
Case Report LN: 5 treatments in the OR, Propranolol 2mg/kg/D
Results

• 3.5% of the total patients treated with Infantile Hemangioma were referred to a cardiologist for consultation regarding Propranolol treatment

• 0% major complications

• 2 patients stopped propranolol treatment secondary to loss of appetite and failure to thrive
Infantile Hemangioma

Simple IH, Inconspicuous

Observation

Simple IH, Large size

1st line: LASER and Intra-Lesional Steroids
Or 2nd Line: Propranolol

Better

Continue Therapy, Stop When Healed

Worse

Complex IH *

Triple modality therapy**

Better

Continue Therapy, Stop When Healed

Worse

Explore Alternative Therapies

*Complex IH=Obstruction of critical organs, very large IH, >10 IH, lesions that fail to respond to other treatments
** Triple Modality Therapy= LASER, Intra-Lesional Steroids, and Propranolol
Clinical Significance

• Our treatment algorithm offers a safe and effective treatment plan IH
• Propranolol is reserved for complex IH
• Triple therapy works well for IH resistant to single modality therapy
Primary Treatment of Hidradenitis Suppurativa Using Nd:YAG Laser

Eric Stelnicki, MD
Hidradenitis Suppurativa
Hidradenitis Suppurativa

Common Locations
- Axilla
- Under Breasts
- Inner Thighs
- Groin
- Buttocks

Hurley Staging

Stage I
- Abscess formation, single or multiple without sinus tracts and cicatrization/scarring

Stage II
- Recurrent abscesses with sinus tracts and scarring
- Single or multiple widely separated lesions

Stage III
- Diffuse or almost diffuse involvement or multiple interconnected tracts and abscesses
Treatment

**Lifestyle Modification**
- Weight loss
- Smoking cessation

**Medical Treatment**
- Topical/oral antibiotics
- Corticosteroids
- Hormone therapy
- Retinoids
- Immunosuppressive/biologic therapy

**Surgical Treatment**
- Incision and drainage
- Debridement/wide excision
Treatment
Hypothesis

• Since HS now considered disease of follicular occlusion...
Purpose

• To determine effectiveness of Nd:YAG laser therapy as primary treatment for HS
Materials and Methods

• Surgical database queried
  – All pts with HS treated with Nd:YAG laser in last 3 years

Datapoints

– Age
– Gender
– Skin type (Fitzpatrick)
– Operative site
– Hurley stage
– Duration of symptoms
– # of laser treatments
– Post-treatment flare-ups

• Pathology results and photographs obtained
Materials and Methods

• Telephone survey
  – “Do you feel that your laser therapy was successful?” (yes, no)
  – “How satisfied are you with your results?” (1-5)
  – “How satisfied are you with your laser hair removal?” (1-5)
## Results

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Average Age = 17
All Female
Results

Skin Type (Fitzpatrick)

- Type 6: 50%
- Type 5: 13%
- Type 4: 0%
- Type 3: 13%
- Type 2: 12%
- Type 1: 12%
Results

Operative Site

- B axilla: 75%
- B inguinal: 12%
- B axilla, gluteal: 13%
Results

Hurley Stage

- Stage 1: 0%
- Stage 2: 87%
- Stage 3: 13%
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Average Duration of Symptoms = 2.4 years
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**Average # of Laser Treatments = 4.6**
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Success of Treatment = 100%
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Patient Satisfaction = 4.75/5
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Satisfaction with Hair Removal = 4.75/5
Results

Pathology (R axilla)

A: Baseline
– Perifollicular and deep inflammation with follicular plugging

B: 1 month after treatment
– Mild perifollicular inflammation with no hair shaft seen

C: 2 months after treatment
– Follicular fibrosis; minimal perivascular inflammation
Results

- 17 yo F with B axillary hidradenitis suppurativa (Hurley stage 2)
Results

• 15 yo F with B axillary hidradenitis suppurativa (Hurley stage 3)
Results

- 12 yo F with B axillary hidradenitis suppurativa (Hurley stage 2)

baseline

s/p 3 laser treatments
Conclusion

• Successful primary treatment of hidradenitis suppurativa with Nd:YAG laser therapy in 100% of patients

• Patient satisfaction extremely high with average satisfaction rating of 4.75/5

• Further prospective studies needed to validate results
Retrospective Review of over 4000 Patients with Head Shape Anomalies

The Truth About Cranial Molding Band Use and the Effectiveness of “Helmet” Therapy

Eric Stelnicki, MD

Associate Professor Plastic Surgery, Cleveland Clinic Florida, Weston Florida
Incidence of Plagiocephaly

- Reports vary between 3.1-61.0% of the newborn population
- Recent article in Pediatrics found it to be 46.6%- Basically half of all the children born today have this problem
- World wide problem since the initiation of the “Back to Sleep Campaign” started in 1992
Causes of Abnormal Head Shape

- Craniosynostosis
- Positional Molding
- In Utero Positioning
- Torticollis
- Other
Characteristics of Plagiocephaly

- Right to left Skull Asymmetry
- Occipital Flattening
- Ipsilateral Frontal Bossing
- Anterior ear Shift
- Diagonal Difference > 6 mm
- Cranial Asymmetry Index > 6.0
Congenital Muscular Torticollis

- Shortening or tightening of the SCM
- Leads to Head Tilt
- Contralateral Head Turning
- Increases amount of time spent on one side of the head
- Adds to Plagiocephaly
- Creates "Torticocephaly"
Characteristics of Brachycephaly

• Short-Wide head form
• Elevated Cephalic Ratio > .91
• Flat Occiput
• Frontal Bossing
• Squamosal Bulging
Treatments of Abnormal Head Shape

- Surgery
- Repositioning of Child
- Skull Massage
- Torticollis Therapy
- New Born Repositioning Devices
- Cranial Molding Orthosis- Star Band and others
In USA, CMO use is Common
Many Articles have Shown CMO’s are Effective

• Graham, JM., et al J. Peds 2005- Treated roughly 150 kids with and without helmets and showed helmets normalized position more than repositioning

• Teichgraeber, JF J Craniofac Surg 2004- Looked at 488 pts. comparing helmet therapy with repositioning and found helmets normalized head shape, where as repositioning did not

• Kluba, S et al PRS 2011 showed early helmet therapy is more effective in younger patients than late therapy (>6 months) in small study of 24 pts.
Then came along the BJM Study

- Renske, MW et al in BJM 2014 - one of few long term, prospective randomized trials from the Netherlands
- Showed no long term difference between between helmet and non-helmet arms at 2 years
- Showing only full recovery of approximately 25% of both groups at 2 years
- Cast doubt on effectiveness of the CMO
Problem - We Don’t Believe This Study!

- Flawed Results
- Improper Measurements
- Improper Band manufacturing or Adjustments
- Small Patient Number
European Study Excluded Torticollis!
Our Hypothesis

• We hypothesize that a properly made and adjusted CMO will normalize Skull form
Study

- Retrospective Review of all patients referred to our center and treated by a single Craniofacial Surgeon and Cranial Molding Orthosis Provider
Methods

• Characteristic of the Skull Shape Deformity was verified by a Star Scan

• All Babies where evaluated by a Star Scan on Initial intake, during Treatment, and at the end of Treatment

• Only plagiocephaly, brachycephaly, and combined Brachycephaly and Plagiocephaly patients were included
Methods

• Presence or Absence of Torticollis recorded
• Patients were seen throughout treatment
• Patients were all direct referrals from Pediatricians who had already attempted repositioning and conservative therapy, but this had failed – This means we are seeing the worst of the worst! (or babies belonging to really “particular” Moms and/or Dads)
• Exclusion criteria included: incomplete records or follow-up, kids not treated with STAR BAND, craniosynostosis
Treatment Protocol

- Star Scan at initial visit, interim scan when child’s head is showing significant progress, at end of treatment
- Patients were typically treated conservatively for a minimum of 2-3 months
  - Conservative Therapy continued until patient has normalized or until no progress towards normalization was noted for at least 2-3 consecutive months and documented on the Star Scan
  - In some cases 6 months of documented conservative care is required by insurance companies
- Torticollis Therapy was prescribed for all infants with any degree of torticollis
Treatment Flow Chart

1. Plagio/Brachycephaly
   2. Rule out Craniosynostosis
      - Surgery if Craniosynostosis Present
      - Conservative Care on initial referral if no CS

       3. Normalization of Head Shape
          4. No Normalization
             - Stop Band and Follow
             - Refer for Star Band

             5. Normalization
                - Stop Band and Follow
                - Refer for second band

             6. No Normalization
                - Confirm effective use of the band
                - Rule out delayed onset craniosynostosis
End Points for CMO Exit

- Oblique diagonal difference < 6
- End posterior symmetry ratio > 90%
- Cephalic index 0.75-0.91
- Cranial Vault Asymmetry index < 6
Results - Patient Stats

• Mean Age of deformity noticed by parents - 2 months (range: birth - 7 months)
• Mean age at beginning of treatment – 7.2 months (range: 3-12 months)
• Male 672(63%) : Female 390(37%) - 2:1 Male to Female
• 92% had associated Torticollis for which they were receiving therapy.
Results

Delivery type and Gestational Age

- \(\frac{2}{3} (653/980)\) of the patients were born via SVD

- Average Gestational age: 38 weeks (range: 31-41 weeks)

- 22% born at or before 37 weeks gestation – Therefore most of the patients treated were not “Premees”
Average Measurements prior to CMO Fabrication

- Oblique Difference: 9.7 (range: 1-20.3)
- Posterior symmetry: 0.84 (range: 0.708-0.973)
- Cephalic Ratio: 0.831 (range: 0.714-1.014)
- Cranial Vault Asymmetry index: 6.5 (range: 0.5-13.1)

- This data has not separated out the plagiocephaly patient from the brachycephaly patient from the combined plagio/brachy patient
Results
Most Patients Normalize and Do Not “Need” a “Helmet”

• 3186/4248, i.e. 75% patients normalized over the course of the Study without a CMO

• This corresponds with the findings of the Netherlands Study

• Our patient population is biased. We see the patients that did not self correct under the watchful eye of the Pediatrician- Therefore this number would be even higher if we included this population!
Results

Nearly All Patients Using the Star Band Normalized

- 1062/4248 patients were placed in a Star Band. 95% of patients who were compliant with a single Star Band Normalized
- 4% normalized with a second CMO with less than 1% needing a third CMO to normalize
- Complete records with proper follow-up was available for 980 (92%) of the patients
- 49 (5%) patients either required or parents requested a second helmet for further head shape correction, with less than 0.1% (8/980) requiring or requesting a third helmet for correction
- Rate of normalization ranged from 2-7 months with a mean treatment time of 3.5 months
- This radically differs from the findings of the Netherlands study at showed only 75% of their helmet patients normalized
Plagiocephaly Treatment
Tortico-cephaly Treatment
Results
The presence of persistent Torticollis was the #1 Factor in Persistent Head Shape Anomalies

- Torticocephaly is harder to treat due to direct muscle action on the base of the growing skull
- Give predisposition to laying on contralateral occiput
- Must treat torticollis to maximize effectiveness of treatment and limit risk of relapse
Results

The Star Band Effectively Corrects Head Shape

- 83% (809/980) of patients were age 6 months or older at beginning of treatment and therefore you do not have to start treatment prior to 6 months of age as some advocate
- Star band was 100% effective in treating these patients to normal, some patients requiring multiple helmets
- Kids over 12 months required longer Star Band use with average treatment time 4.75 months (2-7 months)
- We had no kids over 18 months of age placed into Star Band, but we hypothesize they would show limited or very slow response to the helmet therapy as has been published
Results at Exit of first CMO

- Oblique Diagonal Difference: 2.8 (range: 0.1-9.4)
- Posterior symmetry: 0.93 (range: 0.847-0.989)
- Cephalic Ratio: 0.76 (range: 0.758-0.981)
- Cranial vault asymmetry index: 1.9 (range: 0.2-5.9)
Results at Exit after Second or Third CMO

• Oblique Diagonal Difference: 3.41 (range: 0.2-8.5)
• Posterior Symmetry: 0.975 (range 0.951-1)
• Cephalic Ratio: 0.841 (range: 0.774-0.947)
• Cranial vault asymmetry index: 2.1 (range: 0.1-3.4)
Results

Plagiocephaly = Brachycephaly in Terms of Results

• No difference in the effectiveness of Treatment regardless of diagnosis

• Different helmet used for each which is equally effective

• This differs from Netherlands study - seems there one Helmet type fit all
Severity of Deformity Dictates Length of Treatment

• More Deformity = Longer Treatment

• More Deformity increases the likelihood of the need for subsequent Star Bands
Long Term Results
2-5 year Follow Up

• Relapse rate is 0.3 percent – 1 of which resulted in re-Helmeting

• No reported recurrence in 99.7% of patients
Conclusions

• We agree with the Netherlands Study that 25% of untreated children with abnormal head shapes will Not Self Correct

• We agree that over 75% of children with deformational skull deformities do not need a CMO

• We disagree with Netherland Study about the effectiveness of the CMO.
  – We find 100% of our Star Band patients achieve normal skull form with the use of the CMO
  – This is statistically greater than the Netherland’s non-helmet group
Largest Study Reported

• This is the largest study ever reported with:
  
1. A single craniofacial surgeon

2. A single helmet manufacturer

3. A single orthotist performing adjustments

4. With use of objective data for pre CMO and exit data
Netherlands Proves
Bad Helmet =
Bad Result

• Netherlands Band is similar to the “Other” Bands in the USA which receive very few adjustments.
• Our own internal review shows little change in head shape with this product.
This Study Proves
Good Helmet = Good Result

• Properly made and adjusted Star Bands will normalize the head shape

• This normalization is far greater than that seen in the untreated general population

• This improvement is long lasting and produces a normal head for the long term
Type of Cranial Molding Orthosis

- Star Band
- Doc Band
- C.A.P.
- Michigan Cranial Orthosis
- Hanger band
- Finneston Band
Type of CMO Really Does Matter

- D.E. Couture et al. tx 1050 pts. in Danmar helmets - 2 sizes and 2 colors for all patients

Conclusions:
1. More severe plagio=longer tx
2. Overall correction rate 81.6% for all severity types
3. Argenta Type IV - 73.2% (194/265) normalized
4. Argenta Type V - 47.9% (23/48) normalized
Use of CMO with Surgery

Endoscopic Craniosynostosis Repair
Surgery Technique- Endoscopic

- Endoscopic
  - 2 V-shaped scalp incisions
  - Sub-galeal dissection
Results Endoscopic Repair

Pre-op

Cranial Index = 65

Immediate Post op

Cranial Index = 77

12 months Post op
Endoscopic Results - Sample Case 2

Cranial index = 66

Cranial index = 78
Thank You