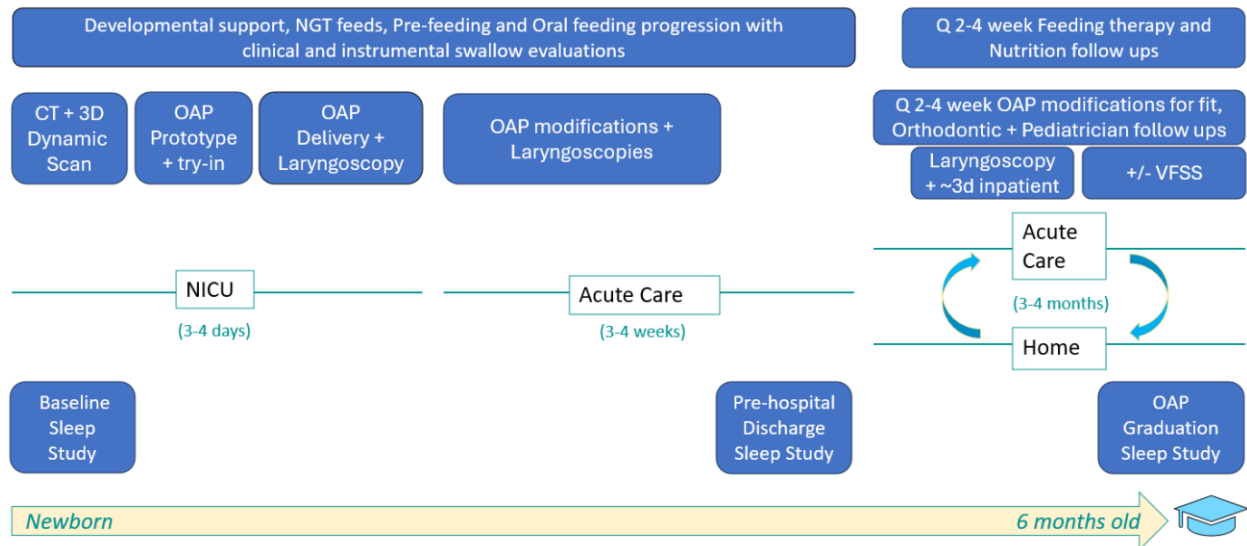


Orthodontic Airway Plate: Seattle Children's Clinical Protocol



Goal: to provide an effective nonsurgical treatment option for the management of severe upper airway obstruction for neonates and infants with Robin sequence (RS)

OAP Team:

Craniofacial pediatrics
 Orthodontic medicine
 Otolaryngology
 Sleep medicine
 Neonatology
 NICU Nursing
 Imaging
 Feeding therapy
 Developmental therapy
 Craniofacial surgery/OMFS
 Craniofacial Nursing

Consider OAP for

Population:

- *Age:* Neonate (ideally < 2 months of age) with RS and a cleft palate
- *Clinical:* Moderate-Severe isolated base of tongue airway obstruction at base of tongue
- *Candidate for escalation* in airway treatment to facilitate safe discharge home.
- *Current treatment:* simple nasal prong interface including LFNC, HFNC/CPAP, (not intubated)
- *Isolated RS* ideal; Avoid OAP if: swallow dysfunction (challenges handling secretions/clearing the airway from secretions), hypotonia, CHARGE, microstomia, unsafe for OAP placement, need for positive pressure ventilation.

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Monitoring during all phases of OAP Care

- Physical Exam: snoring, stertor, swallow, secretions
- Continuous oximetry
- Trend CO2 level (blood gas/total CO2)
- Daily weights

Pre-OAP: Initial Assessments

- *Consults:*
 - Craniofacial pediatrics
 - Therapist, Development (re: positioning, massage, development)
 - Therapist, Feeding (re: oral skills, pacifier)
 - Orthodontist (re: palate and mouth opening assessment)
 - Otolaryngology (re: type, severity, levels of upper airway obstruction)
 - Nutrition (re: tube feeds and growth support)
 - Social work consult (family support)
- *Studies/Imaging:*
 - Facial photos (AP + profile) and Maxillomandibular discrepancy
 - Bedside flexible laryngoscopy by Otolaryngology
 - Baseline Overnight Sleep Study (include 1 REM cycle supine and flat, if safe)
 - Notify sleep MD: OAP timeline, anticipated need for 3 sleep studies:
 1. pre-OAP PSG if safe to obtain on room air.
 2. PSG with OAP in, before hospital discharge (3 weeks from OAP delivery)
 3. PSG at OAP graduation, OAP out (4 months from OAP delivery)
 - CT Face w/o IV contrast + 3D Dynamic Airway (room air, supine, native airway)
 - Consider OR airway evaluation (microdirect laryngoscopy and bronchoscopy) as an optional diagnostic study, especially if concerns or risk for lower airway abnormalities.
- *Provider Huddle and Discussion* with caregivers to discuss treatment options.
 - Craniofacial Pediatrics, Otolaryngology, Orthodontics, OMFS/Plastics
 - OAP Core Team to meet with family/caregivers.
- **Agreement to Proceed with OAP? If yes:**
 - If not already in the NICU: Transfer to NICU for OAP
 - Emergency Airway Signage at bedside
 - Communication Plan with NICU in place: defined by Orthodontist and Otolaryngologist

OAP Creation by Orthodontist

- Oral scan or Impression of the maxillary arch with Orthodontist, Dental assistant, RN, provider
- If maxillary impression
 - Presence of provider from anesthesiology or neonatology
 - OR Procedure Room or bedside
 - Nasal canula (low flow or high flow), backup O2 and airway emergency supplies
 - High vacuum suction
- CT scan data used for spur development.

OAP Delivery: Orthodontist, Otolaryngologist, NICU provider, RN

- *Comfort:* swaddle, option for side/prone position in between plate modifications and airway endoscopies, RN comfort with airway positioning, +/- sweeties or EBM dops
- *Airway:* O2 via nasal canula, BBO2, nasal and oral suction
- *Monitoring:* Continuous oximetry

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- *Multi Step Fitting*
 1. OAP Try In 1st: Otolaryngology and Orthodontist
 2. Back to Orthodontic Lab for refining: Orthodontist
 3. Delivery of the OAP: Otolaryngology and Orthodontist
- *Airway Endoscopies*
 - Awake bedside endoscopy (flexible laryngoscopy) by Otolaryngologist with device delivery
 - Repeat bedside airway endoscopy(ies) with significant device modifications.
 - Comfort person and measures for all endoscopies (ensure comfort before, during after)
- *OAP plate specifics:*
 - Pre-placement: Clean and dry OAP and alveolar ridges with gauze
 - Post-placement: Vertical pressure on OAP/ anterior gumline x 5-8 min by orthodontist, duration per orthodontist (stabilize while the denture cream is setting)
 - Orthodontist training for bedside team and caregivers on:
 - How to remove the OAP if respiratory distress
 - What to be monitoring for (including skin/intraoral/plate)
- *1st 24 hours:*
 - Sidelying position
 - Tube Feeds Only
 - No oral eating, limit pacifier, avoid anything in the mouth that could dislodge OAP
 - Anticipate increased secretions, frequent suction needs and reflux

Call Fors with OAP in place

- **Otolaryngologist on call**
 - Airway obstruction worsening
 - Respiratory distress
- **Orthodontist on call**
 - Device dislodgement
 - Device malfunction (plate, spur, wires)
 - Soft tissue irritation or ulceration
 - Wires bent or irritating skin

Post-OAP (1st 3 days)

- *Daily Rounds:* Craniofacial, Otolaryngology, Orthodontist
- *Communication:* Message OAP team with updates, Craniofacial pediatrician updates to NICU team
- *Orthodontists check* post-delivery day 1 to check for soft tissue irritation + ulceration (palate, posterior edge of appliance, buccal vestibule/space between the gums+lips)
- *Labs:* Blood gas and total CO₂ (every 2-3 days, space out when reassuring trend)
- *Positioning:*
 - OT/PT support
 - Sidelying Only when in crib-- for 1st 2-3 days after delivery
- *Infant Feeding Consult:* Oral Skills evaluation
 - Once airway stable and >24 hours after delivery or per therapist: Bedside clinical swallow evaluation/ Infant feeding consult, assess readiness for initiation of oral feeding
 - Techniques to encourage tongue forward and tongue mobility, myofascial massage
- *Education* for caregivers and bedside team by Orthodontist:
 - Independent OAP removal and placement
 - OAP cleaning
 - Mouth/gum checks

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NICU to Acute Care (Craniofacial Pediatrics) Transfer

- *Ready for transfer when OAP is therapeutic and care stable*
 - CO₂<30, stable or downward trending
 - No O₂ desaturations requiring intervention
 - Suction frequency is reasonable for the floor
 - Emergency Airway signage at bedside and up to date

Acute Care

- Goal: Room Air and Supine
- Continuous oximetry
- Trend CO₂ level (cbg/total CO₂)
- Post-OAP Sleep Study when on room air and prior to hospital discharge
- Daily weights
- OT infant feeding therapist consulting re: oral skills
- Parent education and discharge planning
- Additional Sleep Study if needed (i.e., clinical change, significant modification of OAP spur since last sleep study)

Expect hospitalization at least 3 weeks from OAP placement to discharge

Hospital Discharge Planning/Goals

- Reassuring respiratory status clinically and breathing comfortably; physical exam most important
- Reassuring sleep study done on room air, supine with OAP therapy
- Improving or normal total CO₂ levels
- Reassuring weight gain (25-30 grams per day on average from 0-3 months old)
- Doing well with daily OAP removals for cleaning and mouth checks
- Training on OAP/plate care complete
 - Supplies from orthodontist: elastics, gauze, cotton sticks, steri-strips, adhesive remover, skin prep, denture paste
- Training on feeding and NG tube complete
- Infant CPR training complete
- Infant car seat trial complete, transportation plan if patient lives >2 hours from SCH
- OAP Care Plan complete and shared with caregivers, 1st responders, PCP
- Training on equipment complete
 - DME Enteral: typically NG, pump, home scale
 - DME Respiratory: typically oximetry, backup O₂, oral + nasal suction
- Follow up in place
 - Primary Care Provider within 1 week of going home
 - Craniofacial Team: nurse, pediatrician, feeding therapist, orthodontist about 1 week after discharge

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Outpatient Follow up (1st months)

Will be guided by the infant's specific needs

- Nutrition: Weekly weights on home scale, frequency and dietitian follow up guided nutrition
- Feeding: Visits every 2-4 weeks with feeding therapist (or per their guidance)
- OAP: Visits every 2-4 weeks with orthodontist on Mondays (or per Orthodontist guidance); new impression and modification of plate anticipated 2-3 months into OAP therapy
- Nursing: Visits every 2-4 weeks coordinated on orthodontist visit days
- Pediatrics: Visits every 2-4 weeks to align with feeding and orthodontic visits, space with increasing stability, telemedicine is an option
- Otolaryngology: With plate/spur modifications and endoscopies, every 2-3 months and as needed
- Sleep Study: With any concerning clinical changes

Follow-up Hospitalization: ~2-3 months into OAP therapy

OAP modification to account for growth and need for spur advancement

- Timing: ~2 mos after initial hospital discharge (2-3 months into OAP therapy)
- Plan with team for 48-hour admission, endoscopy, spur and OAP adjustment; sleep study if needed to assess effect of the change. Admission to Craniofacial medicine
- Nutrition consult
- Feeding therapy consult, and discuss if VFSS needs to be coordinated with the admission.

OAP Graduation Hospitalization: ~4-6 months into OAP therapy

Graduation from the OAP when the child is ready

- Start assessing at 3 months into therapy, or if the infant is having challenges with OAP care at home
- Signs of emerging readiness for OAP graduation: tolerating increasing time (up to 2 hours) with the OAP out (including naps on oximetry), breathing well supine with OAP out (request caregiver send a video of breathing)
- Plan early for admission and sleep study (room air, supine, spilt to side or O2 as needed) to assess readiness for discharge home without the OAP. Admission to Craniofacial medicine.
- Nutrition consult
- Feeding therapy consult, discuss if VFSS needs to be coordinated with the admission.
- Scan the final OAP appliance before giving it to family
- OAP graduation certificate from Craniofacial Nursing team