

Please, help me doctor, my child
doesn't stop coughing, always
sick..

A. Avital.

Hadassah, EK, Jerusalem

Case 1: DYY

- 2.2 y.o, female, chronic cough, recurrent fever, recurrent pneumonia, LLL, RUL, RLL, OM, recurrent leukocytosis (30000), rocefin, moxypen, terem
5 chest X rays lastly
- breast fed only, supine position.
- PE lungs rales, noisy breathing, OM, bulging
- normal tonsil size, no clubbing

- sent for IgE (8), eos 0%
- normal sweat test
- chest x-ray and lat neck

Case 1: DYY, chest, 23.1.15
RUL, RLL, LLL



Case 1: DYY, lat neck, 10.2.15



Case 1: DYY, lat neck, 7.10.13 (9m.o)



Case 1: DYY chest 6.8.13



DDY

- moxypen therapeutic, then prophylactic
- dethamycine nasal drops
- clinical improvement

Case 2: FLO

- 18 m.o girl, chronic cough, 6 months, sputum, vomiting, no snoring
- similac bottle, at bed
- Terem, 1 month ago, perihilar bilateral infiltrates, OM, moxypen
- Physical exam, O₂ sat 95%, no shortness of breath, no retractions, crepitations Lt>Rt, normal tonsils, OM Rt>Lt, no clubbing
- augmentin, dethamycine nasal drops
- chest X rays, lateral neck X rays,
- IGE, Blood cell count (% eosinophils), cardiologist (echo)

Case 2: F.L.O

3.3.15



Case 2: FLO



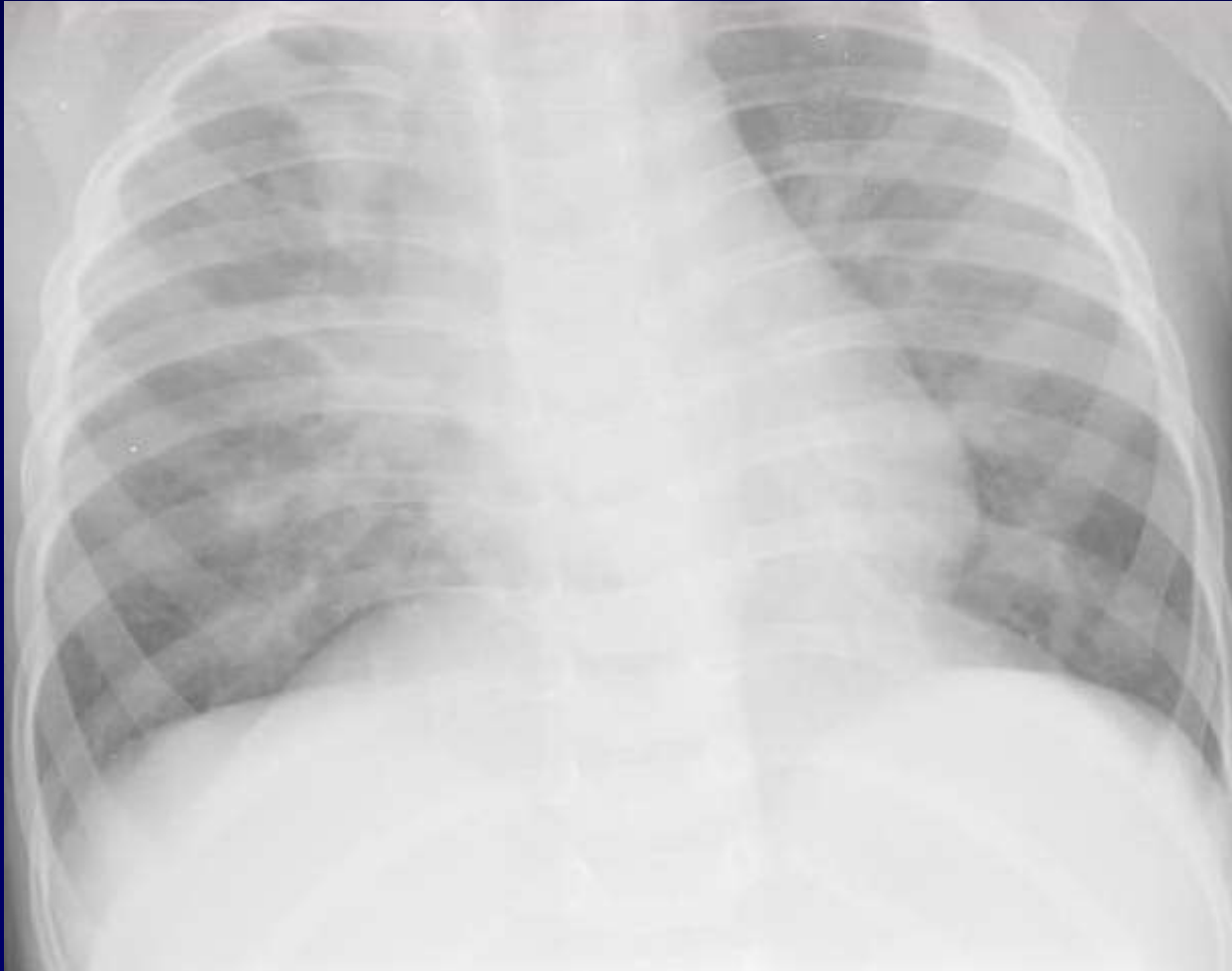
- cardiologist, echo, no evidence of pulmonary hypertension
- IgE 20, eosinophils 1.2% (100)
- on preventive moxypen, dethamycine nasal drops
- stop supine feeding..

- clinical improvement

Case 3: TIN

- 1.2 y, male, 31 w GA, birth weight 2 kg, not ventilated, no oxygen supplement, mild retractions, echo small VSD, closed.
- shortness of breath a few months, inhalations, clinical improvement on flixotide/budicort/ventolin a few months..
- OM, augmentin, azenil
- still cough, noisy breathing
- materna, sitting position..
- PE mild wheezing, SOM bil, normal tonsils, O₂ sat 92%
- sent for IGE, % eos, chest X rays, nasopharynx X-rays

TIN



TIN



Adenoid hypertrophy

Case 3: TIN

- IgE 297, eos 2%
- diagnosed as Asthma, adenoid hypertrophy, aspiration pneumonia, OM bulging bilat
- zinnat, singulair, flixotide, ventolin, dethamycine nasal drops
- then prophylactic moxypen, nasal dethamycine drops
- feeding only in sitting position
- clinical improvement

Case 4: CAM

- 1.4 yo, female, night cough, prolonged period, noisy breathing, OM, conjunctivitis, similac, to bed, no allergies/asthma in family, no smoking
- PE normal, moderately enlarged tonsils, inflammed, SOM, lungs clear
- Chest X-rays, lat neck X-rays, IgE 26, IgG 911, eos 1.1% (100)

CAM



CAM

- moxypen 10 days, then preventive moxypen 1 month
- dethamycine nasal drops
- stop supine feeding
- clinical improvement..

- 4 cases of young children (1-2 y) with chronic cough, recurrent sickness, recurrent bouts of fever, adenoid hypertrophy, OM, bilateral lung infiltrates. One of them had probably also asthma but did not respond to anti-asthmatic preventive therapy, one was only on breast milk...
- Is adenoid hypertrophy the cause of the chronic sickness, persistent fever, leukocytosis, persistent cough, otitis media, recurrent pulmonary infiltrates??

- What is/are the adenoid/s??

adenoid

- greek adeno (gland), oid (resembling)
- the "adenoid tonsil" first described in 1868 by the Danish physician Wilhelm Meyer (1824-1895) in Copenhagen.
- "a long term adenoid hypertrophy will cause an obstruction of the nasal airways. These will lead to a dentofacial growth anomaly that was defined as "adenoid facies".
- he suggested to treat the condition surgically by removing the adenoids

adenoid

- adenoid is part of Waldeyer's tonsillar ring (also called *pharyngeal lymphoid ring* or *Waldeyer's lymphatic ring*) is an anatomical term collectively describing the annular arrangement of lymphoid tissue in the pharynx.
- named after German anatomist Heinrich Wilhelm Gottfried von Waldeyer-Hartz (19th century)
- the ring includes:
 - ◆ 1 (or 2) pharyngeal tonsils (adenoids)
 - ◆ 2 tubal tonsils where eustachian tubes open into nasopharynx
 - ◆ 2 palatine tonsils or "tonsils" or faucial tonsils in oropharynx
 - ◆ 1 (or many) lingual tonsils, on posterior tongue

adenoid

- newborn are born with rudimentary adenoid tissue
- adenoid gland increases in size in childhood, reaches its greatest size by about age 5 years or so and then fades away ("atrophies") by late childhood - generally by the age of 7 years.
- adenoid disappears generally in adults.
- just as the size of the adenoids is variable between individuals, so is the age at which adenoids atrophy.

adenoid hypertrophy in adults

- chronic infection, allergy, obstruction, deviation of nasal septum
- descending spread (chronic sinusitis, chronic rhinitis, otitis media)
- ascending spread (chronic\recurrent tonsillitis, pharyngitis, dental infections)
- pollution and smoking are predisposing factors
- sinonasal malignancies, polyps, benign tumors, lymphoma
- compromised immunity, organ transplants, HIV

adenoid hypertrophy in children

- congenital?
- chronic inflammation
- allergy
- Timme syndrome (insufficiency of the thymus, adrenal and pituitary glands)
- Franke triad (palate abnormalities, deviated nasal septum, adenoid hypertrophy)
- infections (bacterial, viral, EBV)
 - ◆ age 3-12 years, aerobic and anaerobic, strept, staph, enterococcus, Neisseria
 - ◆ close relationship between the bacteriology of the tonsil and adenoid

- bacterial growth of adenoids is probably simple mouth flora at the beginning, but might change with time and treatment (checked only at ages 3-12 y).

Problems with adenoid hypertrophy in children

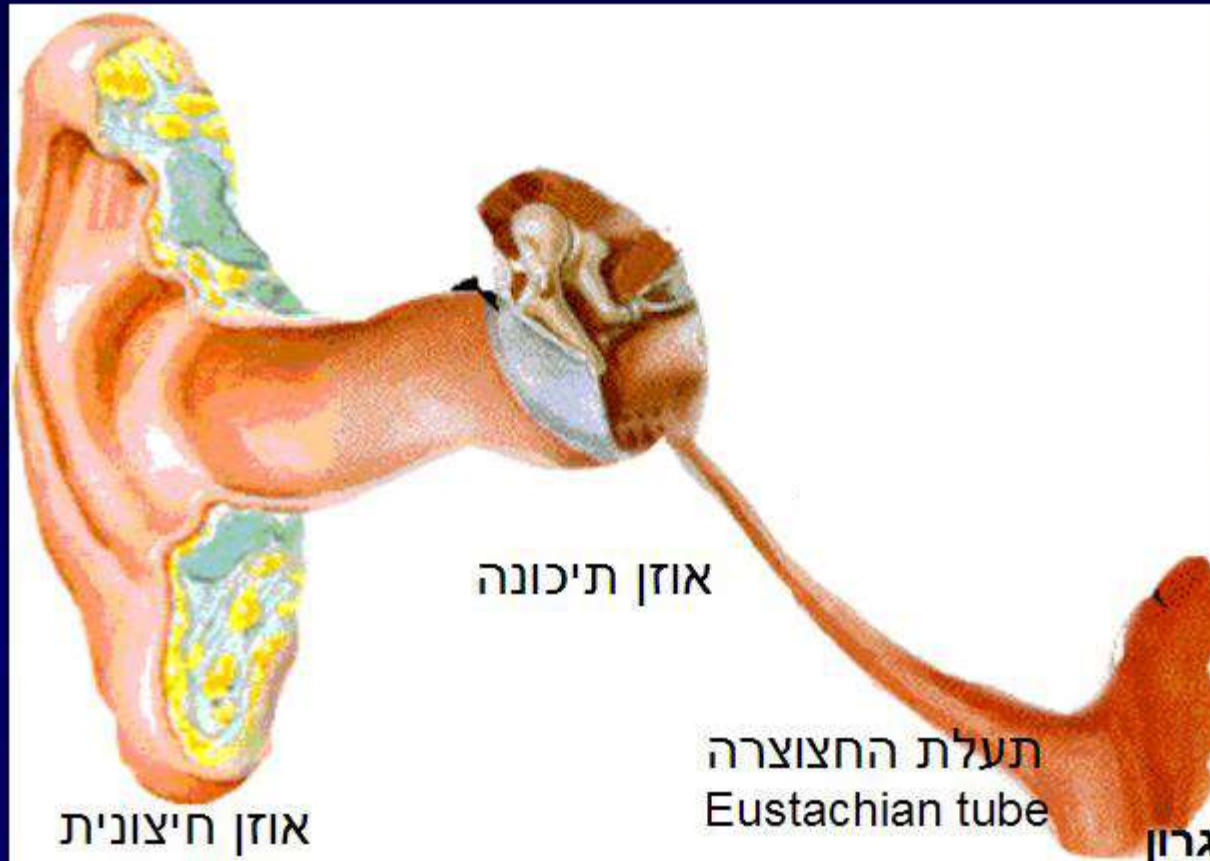
- probably more common than we think!
- real reason unknown
- grows silently until starts to occlude nasal airway
- multi-organ interference
 - ◆ Eustachian tube pressure - serous OM, bacterial OM, hearing loss
 - ◆ sinus drainage impairment - sinusitis
 - ◆ tonsillar infection, ping pong infection (adenoid, ear, tonsils, pharyngeal)
 - ◆ PND, aspiration syndromes, chronic cough
 - ◆ dental infections
 - ◆ vicious cycle infection-enlargement-obstruction-infection





T & A

head upright 90°

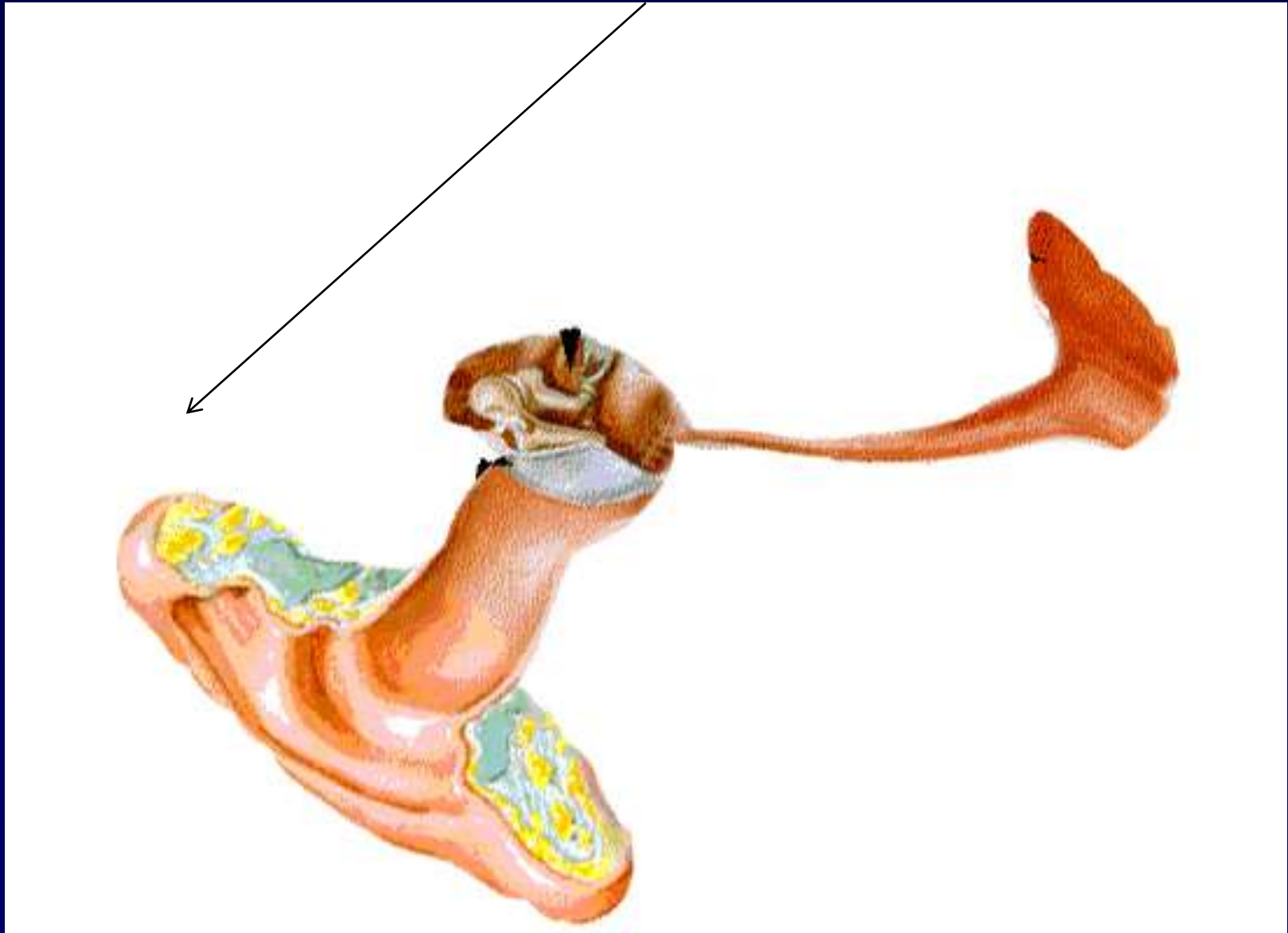


Eustachian tube angle
adults $27.3^{\circ} \pm 2.7^{\circ}$
children $21.2^{\circ} \pm 4.8^{\circ}$

head 30° backward



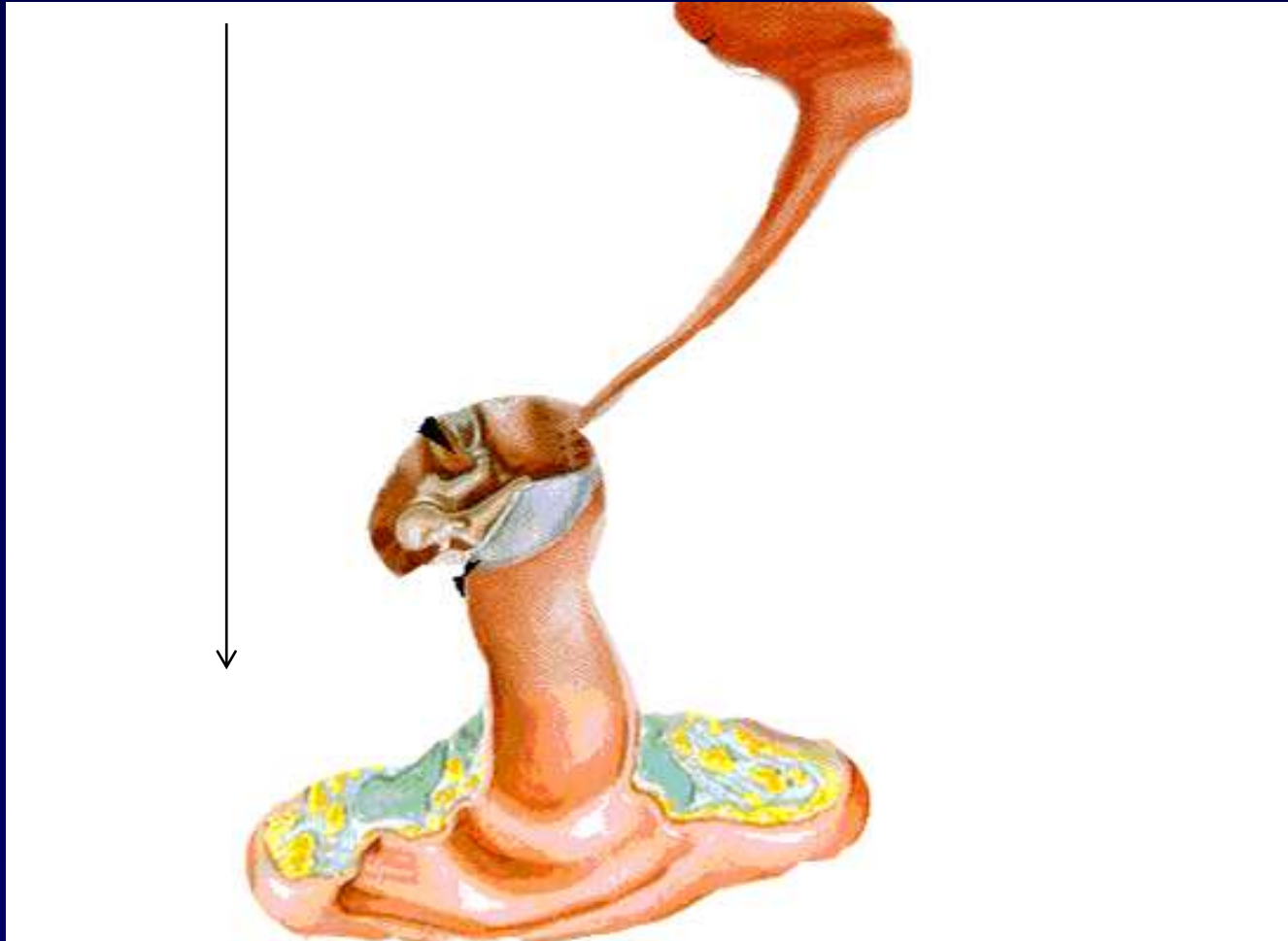
head 45° backward



head backward 60°



with head in supine position, liquid formula will enter freely into the middle ear



Middle ear and feeding position

- early sixties "positional otitis"
- 1995, Susan B. Tully, Bar-Haim Y, Bradley RL: Abnormal tympanography after supine bottle feeding, J. Pediatr 1995;S105-11
- 90 healthy 7-24 m children, hearing test, normal tympanogram,
- after drinking 1 bottle milk
 - ◆ 57 supine position → 59.6% abnormal tympanogram
 - ◆ 33 semi-supine position → 15% abnormal tympanogram
 - ◆ 90% of abnormal tympanograms returned to normal after upright or prone position, 10% did not

Feeding young children in supine position might induce aspiration of milk into the middle ear

Epidemiology of otitis media in children

Teele DW, Klein JO, Rosner BA. Ann Otol Rhinol Laryngol Suppl, 1980:5-6

- epidemiology of OM during the first 3 years of life, Greater Boston Collaborative Otitis Media Program followed prospectively from birth 2,565 children.
- by 3 y of age 71% of the children had had one or more episodes of OM including 33% who had three or more episodes.
- predisposing factors:
 - ◆ sibling with recurrent OM, race (white > black), and sex (male > female).
 - ◆ having a sibling with allergy.
 - ◆ middle ear effusion (MEE) persisted for prolonged periods after OM;
 - ◆ the sole feature associated significantly with persistent effusion in the middle ear after the first episode of OM was the practice of giving a child a bottle in bed.

- What about the connection between

adenotonsillar hypertrophy and pneumonia??

Influence of upper airway obstruction by enlarged tonsils and adenoids upon recurrent infection of the lower airway in childhood

Akiyoshi Konno, Tadahiko Hoshino, Kiyoshi Togawa, Akita City, Japan. The Laryngoscope 90:1709-16, 1980

- children with enlarged tonsils and adenoids suffer from recurrent lower airway infections called "bronchitis bei adenoide vegetationen" or "adenoid brochosinusitis".
- 19 children with snoring and adeno-tonsillar hypertrophy, aged 2-10 y (mean 5.0 y)
- esophageal pressure measured by esophageal balloon, inserted though the nose, between middle and lower $2\frac{2}{3}$ of esophagus (intrapleural pressure)
- tidal volume, respiratory rate, oxygen saturation, pulse rate, impedance pneumography of chest wall, EEG, sleep study

Upper airway obstruction

increased intrapleural
negative pressure

1. esophageal pressure X 4-6!
2. lipiodol into oropharynx:

OSA: aspiration in 8/10

no OSA: aspiration 1/7

Konno A, conclusions

- in children with adeno-tonsillar hypertrophy, the work of breathing is increased during sleep
- children with adeno-tonsillar hypertrophy are prone to aspirate nasopharyngeal secretions and develop lower airway infections

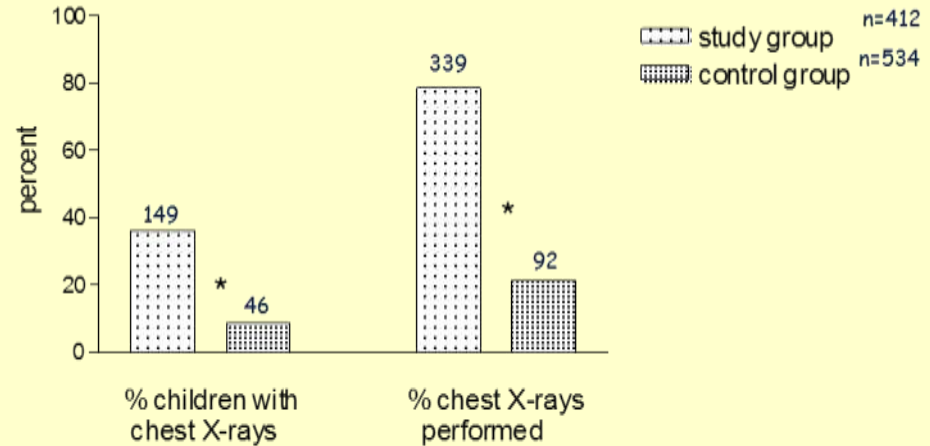
Adenoid hypertrophy in young children and pulmonary morbidity evaluated by chest X-ray findings

S. Hananya, A. Avital , A. Zuabi, D. Lomelski, I. Lavi, J. Horovitz

- do children with adenoid hypertrophy suffer from increased pulmonary morbidity?
- 412 children with a mean age of 3.6 ± 1.3 years at the time of adenotonsillectomy.
- control group of 534 children with a mean age of 3.0 ± 1.8 years at the time of inguinal hernia or hypospadias surgery.
- Haemek Medical Center, Afula, referral center in which all the laboratory and rentgenological studies of the local population are performed.
- all chest X-rays were performed from the emergency room and were not performed as a routine pre-surgery policy.

Hananya S et al

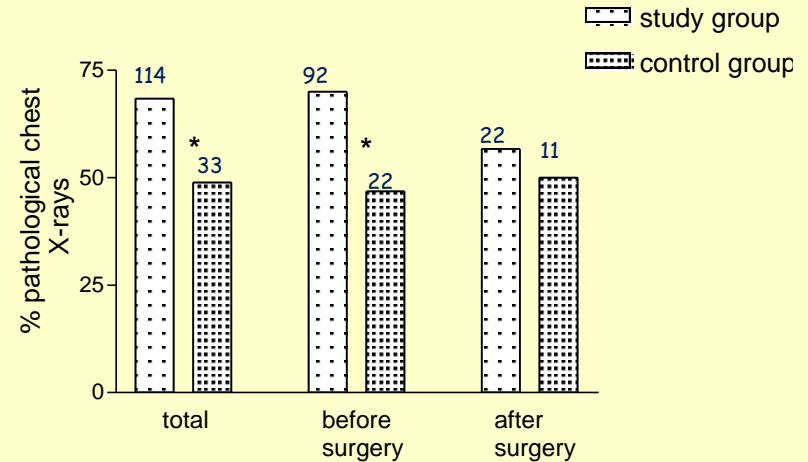
more children from the
adeno-tonsillectomy group
(36.2% vs 8.6%) had chest X-
rays



Hananya S et al

more children from the adenoido-tonsillectomy group had pathological chest X-rays

RUL infiltrates were more present in the adenoido-tonsillectomy group (10.5%vs 0%) while hyperinflation was more frequent in the control group



- although unpublished, this work supports the theory that young children with adeno-tonsillar hypertrophy suffer more from pulmonary symptoms and lung infiltrates

Danino E, Avital A..



Stay, 2 weeks old



Ynon, 6 months old



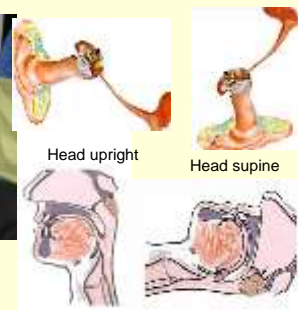
Eran, 5 months old



Tomer, 11 months old



Roy, 5 month old



Head upright

Head supine

Safe feeding

Hypothesis:

Feeding in a supine position is associated with:

1. Middle ear fluids and recurrent ear infections
2. Tonsil and adenoid hypertrophy, obstructive sleep apneas
3. Chronic cough, recurrent pneumonias, bouts of fever
4. Diffuse early dental caries

Recommendations:

1. Get your child fed with his head in **UPRIGHT** position as soon as possible
2. Feed your child **CAUTIOUSLY**, without overfilling his mouth
3. Never feed your child when he is lying on his back
4. If the child is bottle-fed, it should be done by a **PARENT**, with the child's head always in an upright position
5. Switch as soon as possible to eat while **SITTING** around the table and drinking through an **open cup**.
6. Never get him used to take **BOTTLE FEEDING** at bed.
7. Keep **ORAL HYGIENE** as soon as possible before sleep.

Prospective study
Hadassah University Hospital
Mother and Child Health Clinics
Helsinki Ethic Committee Agreement



Hodaya, 3 months old



Maayan, 22 months old

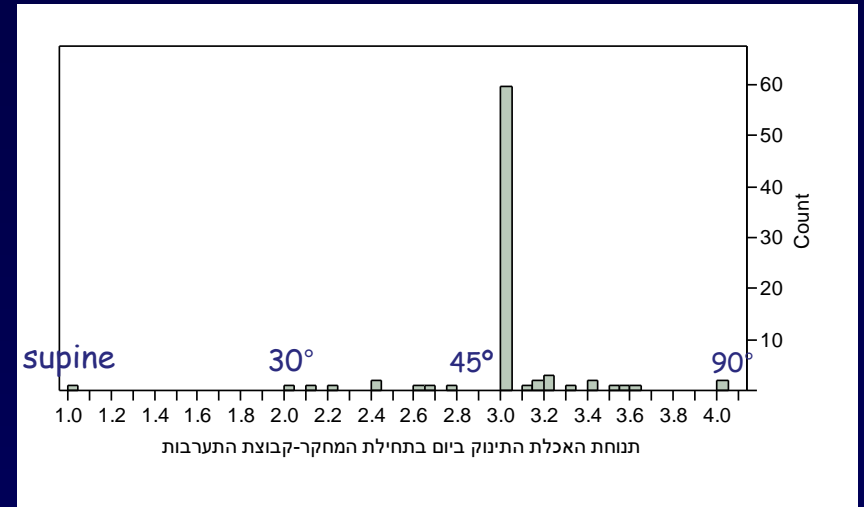
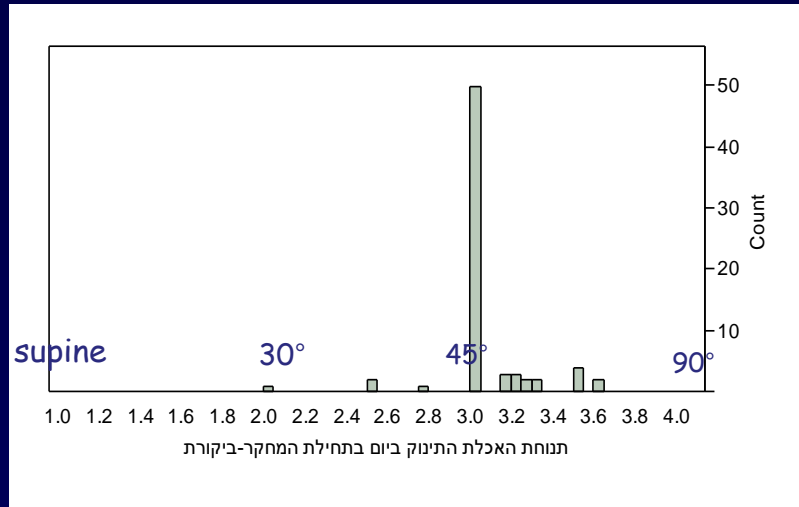
changing feeding position

- study group : 50% at end of study improved feeding position (upright)
- control group : 20% at end study worsened feeding position, (to supine position)
- during days $p < 0.0001$
- during nights $p < 0.02$
- during days and nights $p < 0.0001$
- $R^2 = 0.15$ explanation coefficient 15% of the change is attributed to the intervention program

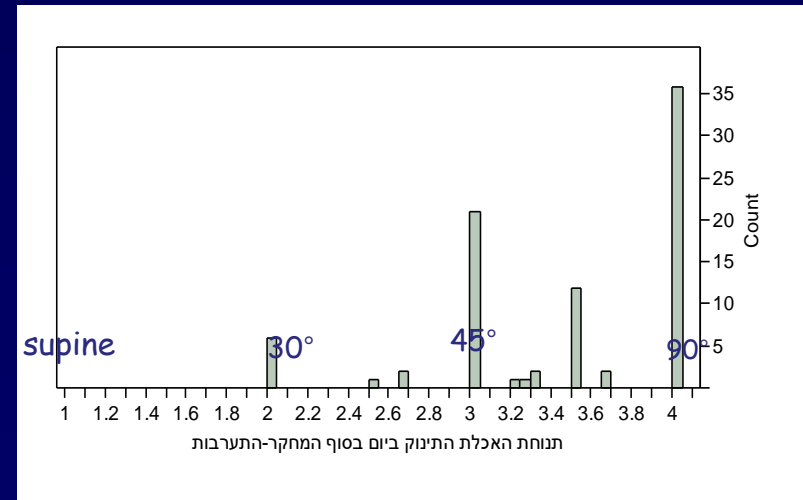
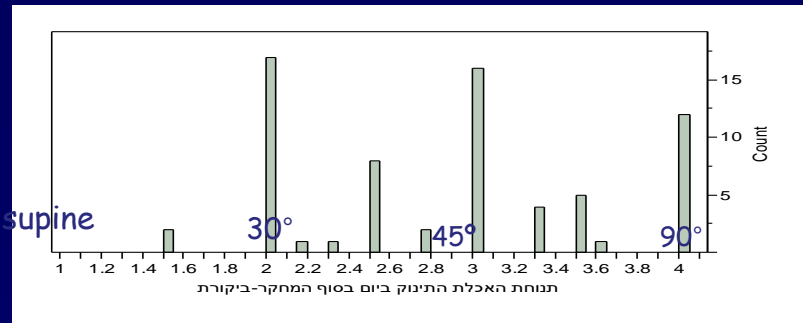
controls

study

start



end



29% >3

61% >3

Morbidity till end of study (12 m follow-up)

% times

	controls	Study
• SOM	39	31
• OM	75	41
• tonsillitis	29	26
• OSA	11	6
• cough	269	207
• purulent nd	65	42
• wheezing	91	50
• noisy breathing	104	75
• bronchitis	52	18
• pneumonia	9	8
• antibiotics	105	80
• inhalations	116	86

ENT morbidity divided 6 and 12 m follow-up (% times)

	3+6		9+12	
	contr	study	contr	study
• SOM	16	10	• 20	21
• OM	33	11	• 37	28
• tonsillitis	12	7	• 14	17
• snoring	29	17	• 29	42
• purulent nd	24	11	• 34	26
• ENT	17	10	• 28	18
• hearing test	4	2	• 15	6
• neck X-rays	0	1	• 4	1

Respiratory morbidity (%) divided 3+6, 9+12 m follow-up

	3+6			9+12	
	contr	study		contr	study
• cough	101	36	•	128	98
• wheezing	28	16	•	50	21
• SOB	10	4	•	13	11
• noisy breathing	36	24	•	44	29
• bronchitis	12	7	•	42	11
• pneumonia	5	2	•	5	4
• chest X-ray	16	6	•	19	10
• inhalations	36	28	•	65	45

General morbidity divided 3+6, 9+12m follow-up

	3+6		9+12	
	contr	study	contr	study
• antibiotics	40	23	• 53	40
• fever >3d	55	35	• 52	28
• MD	119	112	• 53	40
• hospitalization	5	3	• 6	3

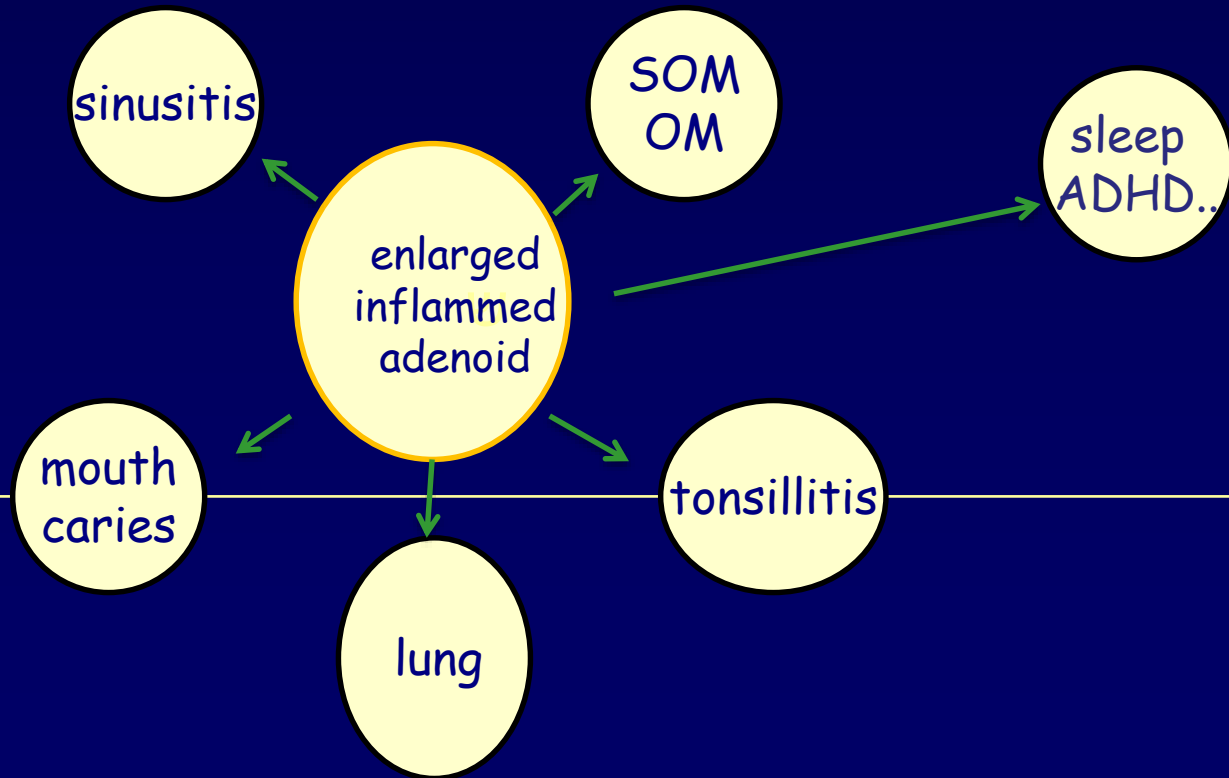
- we have shown a positive influence of the intervention program on the habits of mothers concerning the feeding position of their infant, more mothers in the study group fed their children in an upright position.
- higher feeding position of the infant was accompanied with less respiratory, ENT and general sickness.

till now..

- feeding infants with liquid formula in a supine position might cause aspiration of milk into the middle ear and with time cause recurrent/chronic middle ear infection.
- is this supine feeding responsible for adenoid infection and growing adenoid size?
- adenoid gland is rudimentary at birth, grows silently during the first year of life (in fact it is adenitis and not only hypertrophy), reaches its peak at the age of 4-6 y, then involute and practically disappears at adulthood (unless there is a surrounding chronic infection, anatomical obstruction or immunological disorder).
- adenoid hypertrophy might further worsen ear drainage, worsen sinus drainage, cause spreading of infection, chronic cough, aspiration pneumonia, continuous illness, sleep disturbances,...

therefore...

- feed children with the head in an upright position, like adults..
- keep adenoid in mind... it is not only in the midline, but in the center of spreading infection and disease into ears, nasopharynx, tonsils, teeth (bottle caries syndrome), sinuses, airways and lungs...and brain!!
- adenoidophobia...!



Thanks for your attention!