Lipomatous myelomeningocele, athyrotic hypothyroidism, and sensorineural deafness: a new form of syndromal deafness?

H L Peters, A Bankier

Abstract
This case report describes a 4 year old boy with the unique triad of lipomatous myelomeningocele, congenital hypothyroidism secondary to thyroid agenesis, and sensorineural deafness. While associations between deafness and abnormal thyroid function and deafness and sacral lipoma have previously been described, the constellation of findings in this patient has not been reported. (J Med Genet 1998;35:948–950)

Keywords: lipomatous myelomeningocele; hypothyroidism; sensorineural deafness

Case report
The proband was the first child of non-consanguineous parents aged 33 and 34 years. The pregnancy was uncomplicated and the infant was delivered at term. Initial examination showed a healthy infant with a minor degree of cranial sutural separation and a slightly enlarged anterior and posterior fontanelle. A soft mobile lump was noted over the lateral border of the right sacral region. The remainder of the spine appeared normal. Lower limb structure, neurological function, anal tone, and urinary function were normal.

On day 2 the infant developed unconjugated hyperbilirubinaemia. The maximum bilirubin was 286 μmol/l. The infant required 48 hours of phototherapy.

LIPOMATOUS MYELOMENINGOCELE
The sacral lump noted at birth was shown to be a lipomatous myelomeningocele by ultrasound and magnetic resonance imaging. It was surgically removed at 7 months of age. The tumour was a large lumbo-sacral lipoma with extra- and intraspinal involvement. It was associated with intrathecal tethering and a significant degree of intraspinal involvement with extensive adhesions to structures in the terminal cord. Despite this the child has had minimal neurological impairment of his lower limbs. He walks with an intoed gait and has minimal increase in tone in his right leg with brisker reflexes.

HYPOTHYROIDISM
The diagnosis of hypothyroidism was made on a positive Guthrie screening test and was confirmed with free T4 and TSH levels (T4 <5 pmol/l, TSH >700 mU/l). A thyroid technetium scan showed absence of the thyroid gland and the diagnosis of athyrotic hypothyroidism was made. The infant started thyroxine on day 11 of life. Since this time his free T4 and TSH

Figure 1 The proband showing telecanthus and low set ears (A) front view and (B) profile. (Photographs reproduced with permission.)
levels have remained normal on a daily dose of
75 μg thyroxine. His physical and mental
development have been reviewed on a regular
basis and he has attained all appropriate mile-
stones. Specifically, his linear growth has been
normal.

SENSONEURAL DEAFNESS

At 9 months of age his parents felt that he was
not responding normally to sound. Audiome-
try confirmed a mild sensorineural hearing
loss in the middle frequencies bilaterally.
Investigations (including a CT scan of the
inner ear, ENT and ophthalmological assess-
ment, and TORCH titres) failed to find a cause
for the deafness. There was no family history of
defaSS. Over the next 12 months his hearing
deteriorated with loss of high frequency acuity
and a right and left hearing threshold of 50 db.
Speech assessment at 20 months of age
suggested a two to three month delay. He was
fitted with hearing aids and has subsequently
made good progress with speech development.

In summary, this report describes a child (fig
1) with lipomatous myelomenigocele, athyo-
rotic hypothyroidism, and sensorineural deaf-
ness. There is no relevant family history.

Discussion

Isolated congenital athyrotic hypothyroidism
has an incidence of 1 in 5526. Although pub-
lished reports suggest that there is familial
aggregation of this disorder, patients with con-
genital athyrotic hypothyroidism appear to be
a heterogeneous group. Sensorineural deafness
has an incidence of 1 in 1000. It has been
associated with a multitude of other abnor-
malities and these make up the “s syndrome
congenital deafness” group. Lipomatous mye-
ломенигocele is considered a form of spinal
dysraphism and is rare.

A number of syndromes associate sen-
sorineural deafness with abnormal thyroid dys-
function but not previously with congenitally
absent thyroid gland. The most frequently
reported of these syndromes is Pendred
syndrome. This is thought to account for up to
7% of all cases of congenital deafness. Pendred
syndrome results from an organification defect
of the thyroid with the development of
hypothyroidism in as many as 50% of cases in
one study. The deafness associated with
Pendred syndrome appears to be congenital in
origin and in a number of cases is the result of
a Mondini malformation. The second most
common syndrome associating sensorineural
defaSS and hypothyroidism is Johansen-
Blizzard syndrome. The aetiology of the hypo-
thyroidism in this syndrome is thought to be of
pituitary origin. These patients also have a
characteristic facial appearance (hypoplasia of
the nasal alae), moderate to mild mental retar-
dation, pancreatic insufficiency, and growth
failure. The patient described in this report has
none of these phenotypic features.

Recent reports support an association be-
 tween non-syndromal congenital hypothyroid-
ism and deafness. These reports suggest that
up to 20% of children with congenital
hypothyroidism have some degree of hearing
impairment, usually sensorineural with loss in
the high frequencies. The cause of this
association may be because of delay in thyrox-
ine therapy in the newborn period. For
example, Rovet et al reported a positive associ-
bation between delay in thyroxine treatment (up
to three weeks) and development of hearing
impairment in a cohort of 101 newborns.
Although the thyroid gland and cochlea are
both of ectodermal origin and hence the
association is not altogether surprising, the
exact pathophysiology leading to the hearing
loss is unclear. Animal studies have shown that
offspring of mothers rendered hypothyroid by
thyroid antagonists have immature develop-
ment of the organ of Corti and hair cells. Patho-
logical examination of the cochlea of a
homozygous mouse model for congenital
hypothyroidism showed an abnormality in the
stereocilia of the inner and outer hair cells.
Although the child described in this case report
was promptly diagnosed and treated for hypo-
thyroidism, it may be that such mechanisms
explain the association in this child of sen-
sorineural deafness and hypothyroidism.

There are a number of well recognised asso-
ciations between hypothyroidism and neuro-
logical abnormalities. For example, Jung et al
described two children with anterior chamber
cleavage disorder, cerebellar hypoplasia, hypo-
thyroidism, and tracheal stenosis. Three unre-
lated patients have been described with ecto-
dermal dysplasia, hypothyroidism, and agenesia of the corpus callosum. In terms of
specific spinal abnormalities, two cases of sac-
ral lipoma and sensorineural deafness have
been described. Two of these cases were sibs, both of whom also had cleft lip and palate.

One of the brothers also had extra digital appendages, while the other child had a
rotation defect of the penis, anterior menin-
geocele, and dislocated hip. Gorlin refers to
a third case with similar features to the above
described sibs. Van Langen and Hennekam
\(\text{\textsuperscript{13}}\) described a child with a variety of abnormalities,
including an aberrant “digit-like” appendage,
sensorineural deafness, and large sacral
dimple. The authors suggested that this
constellation of clinical findings represented a
human homologue for the mouse mutant
disorganisation. The mouse mutant disor-
organisation describes a dominant gene that
potentially results in a range of malformations
affecting multiple organs. The striking features of this condition are the limb abnormalities,
with reduction or duplication and limbs/digits
arising from abnormal sites. The patient
described in this report does not have limb
defects or the characteristic hamartomas to
suggest this syndrome.

In conclusion, there are a number of known
associations between the combinations (1)
congenital hypothyroidism and sensorineural
defaSS, (2) congenital hypothyroidism and
structural neurological abnormalities, and (3)
sacral lipoma and sensorineural deafness.
Several plausible pathophysiological explana-
tions have been given for these associations
based on animal models. To date, however, the
unique triad of lipomatous myelomenigocele,
congenital hypothyroidism secondary to thyroid agenesis, and sensorineural deafness has not been reported. Whether this constitutes a distinct syndrome will only be clarified by further reports.

Lipomatous myelomeningocele, athyrotic hypothyroidism, and sensorineural deafness: a new form of syndromal deafness?

H L Peters and A Bankier

*J Med Genet* 1998 35: 948-950
doi: 10.1136/jmg.35.11.948

Updated information and services can be found at:
http://jmg.bmj.com/content/35/11/948

**Email alerting service**

Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

**Notes**

To request permissions go to:
http://group.bmj.com/group/rights-licensing/permissions

To order reprints go to:
http://journals.bmj.com/cgi/reprintform

To subscribe to BMJ go to:
http://group.bmj.com/subscribe/