

A 15-year-old Girl with an Asymmetric Hemitruncal Fat Distribution: Hemihyperthrophy or Hemiatrophy?

Inge van der Velpen, MD*

Pamela Schendelaar, MD,
PhD†

Evelyn van Pinxteren-Nagler,
MD*

Chantal M. Mouës-Vink, MD,
PhD†

Summary: A 15-year-old girl presented to the pediatrician with complaints of excessive fat distribution on the right side and breast asymmetry. At age 2, she had undergone a left-sided nephrectomy because of a stage III Wilms tumor using a transverse cut supraumbilical approach, followed by systemic chemotherapy and local radiotherapy. In the case of trunk asymmetry, it is questionable which side is deviant. The asymmetry may be an expression of isolated hemihyperthrophy, syndromal hemihyperthrophy related to the Wilms tumor, or an expression of left-sided hemiatrophy as a late consequence of radiotherapy, chemotherapy, or surgery. Late clinical manifestations of childhood cancer treatment are difficult to distinguish from other independent diseases but must be considered as explanations for new onset of symptoms in adolescents. (*Plast Reconstr Surg Glob Open* 2016;4:e684; doi: 10.1097/GOX.0000000000000653; Published online 21 April 2016.)

A 15-year-old girl was referred by her pediatrician to the plastic surgeon because of complaints of an asymmetric truncal fat distribution. Written informed consent was obtained from the patient and the parents of the patient for publication of this case report and accompanying images. She complained of back pain with a postural disbalance because of an excessive mass on the right, which she also experienced as a disfigurement. Physical examination demonstrated an asymmetry of the trunk in favor of the right side, with also a breast asymmetry of 2 sizes (Fig. 1). Ultrasound and magnetic resonance imaging demonstrated an asymmetric distribution of subcutaneous fat, with excessive fat at the right flank

and lower back, with a maximum diameter of 6.7 cm to the right iliac crest compared with a maximum diameter of 4.6 cm on the left side, not suspect for lipoma (Fig. 2). No scoliosis was found. Her medical history revealed a left-sided stage III Wilms tumor at age 2 for which she was successfully treated with a left-sided radical nephrectomy and simultaneous central line placement, followed by systemic chemotherapy and local radiotherapy of the left abdominal side according to the NWTS-5 protocol.¹ Radiotherapy was given with 6 MV photons. A dose of 10.8 Gy was applied by means of 2 fields, anterior-posterior/posterior-anterior, in 6 fractions over a period of 7 days. The radiation field included the sacral vertebra 1 up to the thoracic vertebra 10, with the lower field limit halfway through the sacroiliac joints. The contralateral kidney, ovaries, and uterus were not included in the target volume. Until today, no metastases or tumor recurrence is present.

The asymmetric fat distribution was treated with liposuction of the right hip, back, and abdomen, with a satisfactory result. In 2 stages, a total of 950 cm³ subcutaneous fat was removed. It was decided to initially

From the Departments of *Paediatrics, †Surgery, and ‡Plastic, Reconstructive and Hand Surgery, Medisch Centrum Leeuwarden, Leeuwarden, The Netherlands.

Received for publication June 13, 2015; accepted February 2, 2016.

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DOI: 10.1097/GOX.0000000000000653

Disclosure: The authors have no financial interest to declare in relation to the content of this article. The Article Processing Charge was paid for by the authors.



Fig. 1. Trunk (A and B) and breast (C) asymmetry in favor of the right side of the body in a 15-year-old girl.

await further breast development during puberty before applying medical therapy. The discrepancy in breast volume is momentarily compensated by an external prosthesis.

DISCUSSION

In the case of asymmetry of a complete hemitrunk, the question raised is which side of the body is deviant. From the patient's perspective, the left side is considered to be normal, whereas the right side is experienced as disfiguring and counteracts a straight posture. Simultaneously, embarrassment exists about the limited volume of the left breast. From a medical point of view, the asymmetry may be an expression of right-sided hemihypertrophy or, when taking the breast asymmetry and medical history into account, an expression of left-sided hemiatrophy as a late consequence of either radiotherapy or chemotherapy treatment.

Hemihypertrophy is a rare phenomenon characterized by asymmetric overgrowth of 1 side of the body.² The overgrowth may affect one part or different areas, such as the abdomen and extremities.³ It can occur as an isolated disease or as part of a syndrome such as Beckwith-Wiedemann, Proteus, or Klippel-Trenaunay syndromes.^{3,4} In these cases, hemihypertrophy is visible at a very young age, often combined with other dysmorphic features or the presence of a neoplasm, mostly in the liver and adrenal cortex, such as a Wilms tumor.^{3,4} In our

patient, no other dysmorphic features were found that typically match the aforementioned syndromes.

Hemiatrophy is characterized by a decrease in size of cells or particular tissue on 1 side of the body, associated with a variety of pathological conditions such as abnormal cellular or hormonal changes, ischemia, or malnutrition.⁵ The received chemotherapy and radiation therapy may have led to such a condition resulting in trunk asymmetry. Scoliosis and kyphosis secondary to abnormal growth are known complications of radiotherapy after Wilms tumor resection.⁶⁻⁹ Paulino et al¹⁰ demonstrated a dose-response relationship for the occurrence of scoliosis with a lower incidence seen in children receiving <24 Gy and even further decrease with currently applied 10 to 12 Gy. Also, atrophy of the subcutaneous tissue may occur.^{10,11} In our patient, the radiation field mostly corresponded to the location of the trunk asymmetry. However, it does not correspond to the breast asymmetry. In a study by Pintér et al¹² 1 of 10 patients had breast underdevelopment after chemotherapy increasing to 2 of 9 patients after a combination of chemotherapy and radiation therapy. In addition to radiotherapy, anthracycline chemotherapeutics are found to be independent risk factors for tissue hypoplasia.¹³

Finally, the operative procedure may theoretically have contributed to the occurrence of hemiatrophy. The transverse supra umbilical surgical incision or other surgical manipulations during a radical nephrectomy may lead to denervation of the abdominal wall muscula-



Fig. 2. Magnetic resonance imaging of the trunk demonstrating an asymmetric distribution of subcutaneous fat, with excessive fat at the right flank and lower back, with a maximum diameter of approximately 6.7 cm to the right iliac crest in comparison with a maximum diameter of 4.6 cm on the left side.

ture and subsequent hemiatrophy of these muscles and surrounding tissues. In our case, this is unlikely because the asymmetric growth was limited to the subcutaneous tissues with sparing of the abdominal muscles.

In rare cases, breast hypoplasia may occur as part of a syndrome. Once, an association was reported between Poland's syndrome and Wilms tumor.¹⁴ The hypoplasia in our patient could not be explained by such an associated syndrome, because it is restricted to the breast and its subcutaneous fat, without interference of the nipple or pectoralis major muscle.

Most likely, the left breast of our patient has received scatter radiation and, combined with the chemotherapy, this has resulted in breast hypoplasia. Damage seems feasible, as irradiation was given at age 2, which corresponds with the end of a critical period for some aspects of breast development.¹⁵

Unfortunately, coverage of health insurance to correct such breast discrepancy is only provided when a procedure alleviates physical symptoms or improves body function. Breast augmentation is not approved for adolescents under 18 years in the Netherlands nor is there a possibility for insurance reimbursement after the age of 18, leaving this adolescent girl with her cancer treatment–acquired deviancy.

CONCLUSIONS

We have presented a patient with asymmetry of subcutaneous fat of the trunk and a significant discrepancy in breast volume, all in favor of the right side. Most likely, the left-sided truncal fat atrophy is an effect of direct radiation damage, whereas the

breast hypoplasia is caused by scatter damage, all related to the treatment of the Wilms tumor during early childhood. Because clinical manifestations of radiation are difficult to distinguish from other independent diseases, an important role for clinicians is to guide parents to be aware of the late consequences of anticancer therapy. As illustrated, it is tempting to go along in the perspective of the patient in case of body asymmetry; however, clinicians should always consider both sides of the body as deviant.

Pamela Schendelaar, MD, PhD

Department of Surgery
Medisch Centrum Leeuwarden
Henri Dunantweg 2
8934 AD Leeuwarden, The Netherlands
E-mail: p.schendelaar@gmail.com

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