Klippel-Trenaunay-Weber syndrome (angio-osteohypertrophy syndrome)

DENIS L VILJOEN

From the MRC Unit for Inherited Skeletal Disorders and Department of Human Genetics, Medical School, University of Cape Town, Observatory 7925, South Africa.

In 1900, Klippel and Trenaunay¹ first described the classic triad of cutaneous haemangiomas, hemihypertrophy, and varicosities. Subsequently, Weber² reported several subjects with the additional features of arteriovenous fistulae. The eponymous designation of Klippel-Trenaunay-Weber syndrome (KTWS) is now universally applied to the disorder.

FIG 1 Hypertrophy of the right leg in a 13 year old girl with KTWS.

Received for publication 19 November 1987.
Accepted for publication 24 November 1987.

The prevalence of KTWS is unknown. It is a rare condition and few large series have been reported.

Clinical manifestations (figs 1 to 3)

SKIN

The cardinal dermatological feature of KTWS is the presence of capillary or cavernous haemangiomas which may involve any region of the body, but particularly the limbs and trunk. Other cutaneous manifestations include telangiectasia, papillomata, pigmentary streaks, cutis marmorata, and varicose ulcers.³ The latter have a predilection for the lower limbs and form in areas of venous stasis.

VASCULAR

Varicose veins are a major component of KTWS; these may be obvious at birth, but frequently only become evident after walking starts. The deep venous system is often hypoplastic or atretic, resulting in blood diversion to the superficial vessels. A small number of affected persons have arteriovenous communications; these may be microscopic, but some reach a substantial calibre causing cardiac decompensation. Atresia or hypoplasia may also affect the lymphatic vessels, and cause lymphoedema of the limb distal to the obstruction.

SKELETAL

Hypertrophy involving one side of the body or overgrowth of a single limb is a major manifestation of KTWS. Growth of the affected part is usually rapid during early childhood but ceases after the pubertal growth spurt.⁴ All components of the affected limb, including muscle, bone, and connective tissue, are hypertrophied and occasionally polydactyly or syndactyly are associated features.

ASSOCIATED FINDINGS

Haemangiomas may involve any organ system, but the lung, large bowel, bladder, liver, and tongue are

FIG 2 Capillary haemangiomata confined to the right thigh.

particularly affected. Sequestration of platelets in large cavernous angiomas may lead to thrombocytopenia and a bleeding diathesis. Rectal and vesical bleeding are uncommon complications. Aseptic cellulitis presenting as painful, indurated, erythematous lesions of the skin has been reported.⁴

These episodes may be due to infarction or lymphangitis and occur mainly in affected limbs. Mental retardation and seizures are common in patients with KTWS, especially those with facial angiomas, but no associated intracerebral lesions have been found.

FIG 3 (a) Gross malformation of the right leg associated with cavernous haemangioma in an infant.

FIG 3 (b) Radiograph showing a catheter within an aberrant blood vessel in the affected limb.

FIG 3 (c) Anomalous blood vessels are shown following the injection of contrast material.

Differential diagnosis

The Proteus syndrome⁵⁻⁷ can be differentiated from the KTWS but syndromic boundaries are ill defined in both disorders and overlap occurs. Subjects with Proteus syndrome lack the cutaneous angiomas found in KTWS, but have bizarre digital overgrowth and the additional features of subcutaneous lipomata, thickened skin of the palms and soles, cranial exostoses, and multiple soft tissue hamartomata. Sturge-Weber syndrome, neurofibromatosis, and Maffucci syndrome have some manifestations in common with KTWS but usually can easily be excluded by recognition of other characteristic stigmata.

Management

There is no curative treatment for capillary haemangiomas but cosmetic creams can mask disfiguring lesions. Surgical relief of obstructed venous channels and excision of veno-occlusive fibrous bands has been advocated,⁸ but this management has not been universally accepted. Stripping of superficial

varicose veins is contraindicated due to the lack of an adequate deep venous plexus and the risk of aggravating venous stasis and oedema. The wearing of elasticised stockings is recommended to minimise these latter complications.

Persistent severe varicose ulceration and secondary infection resulting from chronic oedema may eventually necessitate limb amputation in a minority of affected persons. Recently a pressurised sleeve has been devised which, when applied for a few hours to an affected limb, massages oedema fluid centripetally. Considerable reduction in limb girth has been achieved through daily use of this apparatus thereby minimising the complications of lymphangitis, thrombophlebitis, or varicose ulcer formation.

Inheritance

There is little evidence for any chromosomal or genetic basis for KTWS. A brother and sister with the disorder have been described by Lindenauer⁹ while Koch¹⁰ suggested autosomal dominant inheritance. Nevertheless, the vast majority of cases are sporadic.¹¹ No environmental factor or teratogen has been implicated as a causative agent.

References

- Klippel M, Trenaunay P. Du naevus variqueux ostéohypertrophique. *Arch Gen Med* 1900;185:641-72.
- Weber FP. Angioma formation in connection with hypertrophy of limbs and hemihypertrophy. *Br J Dermatol* 1907;1:231-5.
- Viljoen D, Saxe N, Pearn J, Beighton P. The cutaneous manifestations of the Klippel-Trenaunay-Weber syndrome. *Clin Exp Dermatol* 1987;12:12-17.
- Viljoen D, Pearn J, Beighton P. On the natural history of the Klippel-Trenaunay-Weber syndrome: a review of ten cases. *Clin Dysmorphol* 1984;2:2-6.
- Viljoen DL, Nelson MM, de Jong G, Beighton P. Proteus syndrome in Southern Africa: natural history and clinical manifestations in six individuals. *Am J Med Genet* 1987;2:87-97.
- Wiedemann HR, Burio GR, Aldenhoff T, Kunz J, Kaufmann HG, Schire E. The Proteus syndrome. *Eur J Paediatr* 1983;140:5-12.
- Gorlin RJ. Proteus syndrome. *J Clin Dysmorphol* 1984;2:8-9.
- Servelle M. Klippel and Trenaunay's syndrome. *Ann Surg* 1985;201:365-73.
- Lindenauer SM. The Klippel-Trenaunay-Weber syndrome: varicosity, hypertrophy and haemangioma with no artero-venous fistula. *Ann Surg* 1965;162:303-14.
- Koch G. Zur Klinik, Symptomatologie, Pathogenese und Erbpathologie des Klippel-Trenaunay-Weber'schen Syndroms. *Acta Genet Med Gemellol (Roma)* 1956;5:326-70.
- Gorlin RJ, Pindborg JJ, Cohen M. Angio-osteohypertrophy syndrome. In: *Syndromes of the head and neck*. New York: McGraw-Hill, 1964:47-9.

Correspondence and requests for reprints Dr Denis Viljoen, Department of Human Genetics, University of Cape Town Medical School, Observatory 7925, Republic of South Africa.