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Operative techniques

Use of angioembolization as an effective technique for the management of pediatric solid tumors

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Abstract

Purpose: In oncology practice, angioembolization has been reported for tumor reduction before surgery, treatment of life-threatening conditions, and for palliative care. Nevertheless, the overall experience with angioembolization for the treatment of tumors is limited. We report our experience in 7 nonvascular solid pediatric tumors.

Materials and Methods: A retrospective review was carried out of medical records from pediatric patients (0-18 years) with solid nonvascular tumors who underwent angioembolization in the last 5 years at our institution.

Results: Seven patients underwent embolization: 2 neuroblastomas, 1 metastatic paraganglioma, 1 hepatoblastoma, 1 myofibroblastic tumor, 1 osteosarcoma, and 1 undifferentiated sarcoma. The reason for angioembolization was preparation for surgery (3), treatment of a life-threatening event (1), or palliative care (3). Each case is presented and discussed. The outcome was subsequent complete surgical resection in 3 cases, tumor vanished in 1 case, symptom control was achieved in 1, and the other 2 patients improved their survival and quality of life, however, died of disease progression.

Conclusions: Tumor angioembolization may enter the treatment algorithm for selected patients who have to face difficult or unwarranted surgical procedures or have diseases where conventional therapies have failed.

Angioembolization means elective obstruction of arterial flow. Embolization is performed by using a coil or different kinds of gelatin microspheres (Embospheres) depending on the diameter and characteristics of the artery being embolized. Blocking the blood supply to a tumor can be clinically very useful. Chemoangioembolization consists in the direct administration of chemotherapeutic agents into the tumor through selective blood vessels, followed by angioembolization.

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In oncology, angioembolization has been reported for facilitating surgery through hemorrhage control, for tumor reduction before surgery, for the treatment of life-threatening situations, and for palliative care [1,2]. Nevertheless, the overall experience with angioembolization for the treatment of tumors is limited, and most publications refer to adults. Experience in children is minimal, reduced to a few case reports, mostly for liver tumors [3-8]. The aim of this report is to review the outcome of our patients who underwent angioembolization during the management of a nonvascular solid tumor.

1. Materials and methods

A retrospective review was carried out of the medical records from all pediatric patients (0-18 years) with solid nonvascular tumors that underwent angioembolization in the last 5 years at our institution. Besides demographics, the data collected included the type of tumor, the reason for angioembolization, the number of angioembolizations performed, the outcome of the procedure, complications, and survival.

1.1. Angioembolization technique

A 4F introducer and then a 4F carrier catheter are guided through the femoral vein into the tumor nutritious vessel under general anesthesia. After identifying the tumor vascular blush, a 1.7F to 2F microcatheter (Boston Scientific) is used for selective or superselective angiography; embospheres of adequate size are then injected until complete flow stop. In case of chemoembolization, the agent is injected, and the vessel is then sealed with embospheres. A new angiography is done to check the complete tumor devascularization as well as the preservation of all normal circulation.

Table 1 Clinical summary of cases

Case	Sex	Age	Type of tumor	Purpose for angioembolization	No. of angioembolizations	Outcome of the procedure	Complications	Outcome of the disease
1	Female	3 y	Hepatoblastoma of the right hepatic lobe with pulmonary metastases	Preparation for surgery	1	Comfortable right hepatectomy with no complications and minor bleeding	None	NED after 5 y
2	Male	8 mo	Mediastinal stage III NB	Preparation for surgery	1	Complete tumor resection with no complications	None	NED after 2 y
3	Male	Newborn	Myofibroblastic tumor of the left lung with pulmonary hilium infiltration	Preparation for surgery	1	Comfortable surgery with no major bleeding	Left renal atrophy (presumably because of low blood flow)	NED after 4 y
4	Male	19 mo	Right suprarenal N-*myc* positive stage III NB	Life-threatening event	1	Hemodynamic unstability immediately controlled	None	NED after 2 y
5	Male	13 y	Retroperitoneal paraganglioma with multiple highly vascularized hepatic metastases	Palliative	14	Control of disease progression with good quality of life	None	AWD, good quality of life
6	Female	12 y	Undifferentiated skull osteosarcoma	Palliative chemoangioembolization	2	Tumor devascularization accomplished	None	DOD after 2 y
7	Male	14 y	Undifferentiated sacral and paravertebral sarcoma	Palliative chemoangioembolization	1	Slowing of progression	Sacral neuralgia during 1 mo	DOD after 4 y

AWD indicates alive without disease. NED indicates No evidence of Disease. DOD indicates Died of Disease.