Pediatric Hematology/Oncology in Morocco

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The Kingdom of Morocco, situated at the North West tip of Africa and bordered by the Atlantic Ocean and the Mediterranean Sea, covers an area of 710,850 km². The population exceeds 30 million, children under the age of 15 representing 31% of the population. Morocco faces the problems typical of developing countries; 19% of the population living below the poverty line and up to 50% being illiterate. Only 16% of the population has health care insurance.

The health care system in Morocco is a mixture of government institutions as well as private system. Most of economic activity is concentrated in Casablanca and Rabat (the capital).

Organization of care

Up to late seventies of the last century, patients with cancer have been treated in a radiation center in Casablanca. This center was not equipped to take care of children with cancer. Patients were admitted in different wards of the hospitals and treatment programs varied greatly according to availability of drugs. The tremendous progress reported in childhood cancer stimulated the creation of specialized units.

Organized pediatric oncology activity started in the early 80’s when two units opened in the two university hospitals of Morocco, Casablanca and Rabat. In Casablanca the Department of Hematology and Pediatric Hemato-Oncology was created in 1980 by Noufissa Benchemsi and Said Benchekroun. In Rabat, Fouzia Msefer-Alaoui initiated a unit in Children’s Hospital in 1982.

The two teams tried to apply modern protocols. There has been good pediatric surgery, pathology, radiology teams that helped the young pediatric oncology teams. At that time, many medications were not available.

In 1986, the National Cancer Institute opened in Rabat, which offered a better radiotherapy facility for children. Another unit opened in Casablanca and other private clinics in Casablanca and Rabat started a consistent pediatric oncology activity.

Given the inadequate quality of supportive care facilities, specifically the lack of blood products and antibiotics, intensive chemotherapy was not used. Most patients had no health insurance and could not afford to pay for their treatment and not infrequently even the cost of transportation to the units. Likewise, the hospital had very limited resources and could not provide such expensive treatment. It thus became clear that quality of care could not improve without additional help. Associations of volunteers and donors were therefore set up. Agir in Casablanca (www.association-agir.org) and Avenir in Rabat (www.almoustakbal.org) have proved to be very efficient and have helped the hospital teams in their endeavors to provide optimal care. Most of patients needs regarding medication is provided by these NGOs. These associations have also renovated the wards and hired personnel to help the teams. In Rabat, Avenir constructed a house for the parents and patients named Maison de l’Avenir. In Casablanca, Agir set up bone morrow transplantation unit, the first one in the country.

Supportive Care

Infection related mortality of patients was of great concern. From 1980 to 1985, retrospective analysis of 138 neutropenic patient’s mortality was of 36% (1). No curative treatment was proposed for patients with acute non lymphoblastic leukemia (ANLL) in the first years. There have been special interests in improvements in supportive care, increased awareness of the importance of hygiene, education of patients and improvements in nursing education. Another factor has been the
quality of blood products: a Quality Control Committee for Blood Transfusion Services has been set up. Screening for hepatitis B and C and for HIV is now routinely carried out. As a result, the incidence of hepatitis C has fallen from 26% to 6% in patients receiving multiple transfusions. Infection Control Committee has been set up and is working closely with the medical staff.

Improvements in supportive care have resulted in a significant decrease in mortality from neutropenic sepsis. From 1983 to 1995, 117 patients with ANLL have received 2 to 3 courses of chemotherapy using daunorubicin or doxorubicin and standard dose cytarabine. Complete remission (CR) was obtained in 57% of patients and toxicity related death was of 18.7% \(^2\). From 1996 to 2003, 67 patients received 2 to courses of chemotherapy one course of high dose cytarabine. The CR increased to 69% and toxic death t dropped to 11%. This coincided with the renovation of the ward and better equipment of patients’ rooms (including sinks). EFS in this group is 28%.

**Lymphomas**

In view of the potentially good prognosis of patients with lymphoma, this was considered to be a priority and resources were allocated to improve survival in these patients. Ninety five patients with Burkitt’s lymphoma have been treated according to the French LMB89 protocol. Most patients (73.5%) had an abdominal presentation; the diagnosis was made on the basis of fine needle aspiration in 60% of cases. The majority of cases (63%) had Stage III disease. Complete remission was achieved in 68.5% of cases; the 5 year survival was 56%. Ten of the 15 patients who died did so before or shortly after initiation of treatment due to metabolic and nutritional complications \(^3\). The greatest problem is that patients present with very advanced disease because of delays in diagnosis and the long distances involved in reaching the hospital.

With regard to Hodgkin’s disease (HD), 181 children have been treated up to 2001. Chemotherapy regimens comprised ‘MOPP’, ‘COPP’ or ‘ABV’. Again, most patients presented with advanced stage disease and the high rate of lost to follow-up (35%) because of the unaffordable cost of work-up and treatment. An unexpected finding was the incidence of Hodgkin’s disease in very young children at the time of presentation \(^4\).

**Collaborative programs**

The teams are now well established and are treating more that 800 new patients a year. A good multidisciplinary group of pediatric oncologists, surgeons, pediatric radiologists, pathologists and radiation therapists are working closely together. This is reflected in some good results obtained in solid tumors \(^5\). The teams are working closely together and created the Moroccan Society of Hematology and Pediatric Oncology (SMHOP) in 1996. SMHOP (www.smhop.info) has organized continental meetings of SIOP in 1998 and in 2006 and is organizing regular national meetings.

Moroccan group has developed a fruitful cooperation with International Outreach Program (IOP) of St Jude Children’s Research Hospital (Memphis, TN, USA) directed by Judith Wilimas and Raul Ribeiro. The program has focused on nursing, together with improvement in pathology services and infection control, as well as data management, immunophenotyping and cytogenetics for leukemia and the development of adapted therapeutic protocols. Internet based communication system is being used as a useful tool to develop various actions and discuss patients cases to have second opinions. With the help of IOP, Moroccan group has developed protocols for ANLL (AML-Ma 2003) and HD (MDH-Ma 2004). In AML-Ma 2003 the objectives are to get CR rates at 70%, toxic deaths less that 10% and EFS at 40%. The preliminary data on the first 27 patients included showed that CR is at 85%; toxic deaths at 11%. It is interesting to note that the toxicity is the same as in the earlier experience even with more intensive treatment. In MDH-Ma 2004, the main objective is to reduce the abandonment rate to less than 10%. Of the 51 patients included so far, the abandonment rate is of 10% but the initial workup is still lasting 3 weeks.

Moroccan group is also an active member in French African Pediatric Oncology Group (FAPOG) led by Jean Lemerle (Villejuif, France). This group is now focusing on Burkitt’s lymphoma and Wilms tumors. Interesting results have been achieved through a prospective
multicentric work in 6 African countries (Algeria, Cameroon, Madagascar, Morocco, Senegal, and Tunisia) (6, 7).

More recently, Moroccan group has been selected among the country benefiting from UICC My Child Matters initiative (8). Pain control and early diagnosis in childhood cancers are being developed through this initiative.

**What next?**
The medical teams are very dedicated and enthusiastic. They are still striving to diagnose the patients earlier and to provide them with the best means to get better chances of cure. They are aware of the fact that several aspects of care are in need of improvement.

They are considered as a model in the country for the multidisciplinary approach and the capacity to build together programs to improve the quality of care. This has to be developed further. Through SMHOP, the group is initiating national programs for treatment. A capacity to identify, to develop adapted program to local conditions and also to monitor the programs is considered as an important tool to develop pediatric oncology in the country. The help of groups like FAPOG and IOP is of great importance in building such capacity. The ongoing experience with UICC is also promising.

No progress can be achieved without social support to patients and parents (9). The recent interest in cancer in the country, the fact that more patients will have health care insurance are considered as important opportunity to get more support for patients and their families.

There is also a need for the creation of other units throughout the country to take care of children suffering from cancer. Some physicians trained in the pediatric oncology units working in different cities in the Kingdom are able to follow some patients for maintenance therapy or follow up.

**References**

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