```
#include <stdio.h>
#include <stdlib.h>
#include <time.h>
#include <mpi.h>

int main(int argc, char *argv[]) {
  if (argc != 2) {
    printf("Usage : alltoall message_size\n");
    return 1;
  }

  int rank;
  int num_procs;
  int size = atoi(argv[1]);

  MPI_Init(&argc, &argv);
  MPI_Comm_size(MPI_COMM_WORLD, &num_procs);
  MPI_Comm_rank(MPI_COMM_WORLD, &rank);
  int i;
  char input_buffer[size*num_procs];
  char recv_buffer[size*num_procs];
  srand(time(NULL));
  for (i = 0; i < size; i++)
    input_buffer[i] = rand() % 256;
  int j;
  for (j = 1; j < num_procs; j++) {
    int k = 0;
    for (i = j*size; i < j*size + size; i++) {
      input_buffer[i] = input_buffer[k];
      k++;
    }
  }
  double total_time = 0.0;
  double start_time = 0.0;
  for (i = 0; i < 100; i++) {
    MPI_Barrier(MPI_COMM_WORLD);
    start_time = MPI_Wtime();

MPI_Alltoall(input_buffer,size,MPI_CHAR,recv_buffer,size,MPI_CHAR,MPI_
COMM_WORLD);
    MPI_Barrier(MPI_COMM_WORLD);
    total_time += (MPI_Wtime() - start_time);
  }

  if (rank == 0) {
    printf("Average time for alltoall : %f secs\n", total_time/100);
  }

  MPI_Finalize();
}
```